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## The Halford Oration.[1]


By E. C. DODDS,

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To be asked to visit the University of Melbourne is in itself a great honour and a most interesting experience, but in addition to this to be invited to deliver the Halford Oration is perhaps one of the greatest distinctions that the university can bestow on a visitor. I feel the responsibility very greatly, first because of the responsibility of honouring Professor Halford's name and secondly because of the illustrious series of predecessors who have already succeeded in this task. Many of my predecessors have been your countrymen and a number of them have also been students and graduates of this university; in fact quite a few remember the professor and were actually students during his time. It is only natural that those should have taken the opportunity of dealing fairly fully with Professor Halford's life, his work, his teaching characteristics and his personality, and I feel, therefore, that it would be little short of an intrusion were I to attempt to enter this field. Dr. A. L. Kenny, who delivered this oration in 1940, gave a very fascinating account of Professor Halford and also gives many references to others who have commented on his life. I will, therefore, only remind you very briefly that Professor Halford was one of the last of the remaining professors of what used to be called the Institutes of Medicine. This included anatomy and physiology and, in some universities, medicine at the same time. Professor Halford, who was born in 1824 in the village of Petworth, was brought up in affluent circumstances where he was in contact with the typical English culture of the countryside and the suburban towns. His medical education took place at Saint George's Hospital and a college that was then associated with it and afterwards became the medical school of that hospital. It is recorded that he entered the hospital in 1842 and he qualified in medicine. After teaching for a time at a school of anatomy he decided to come to Australia, and it was this university that he chose and to which he devoted the whole of his professional life. He lived to be a very great age and remained in active work at the university until a few years before his death; it is because of his great age that I feel justified in taking as my title for this oration "The Study of the Question of Aging".

Before we commence this interesting subject, it will perhaps not be unwise to look back into the literature. There is no doubt that practically everyone who has started to write on this subject turns at once to the famous work of Cicero's *De Senectute*. This work, an essay addressed to

[1] Delivered at the University of Melbourne, August 21, 1952.

one of his friends, describes in considerable detail the meditations on the subject of old age, a state which unfortunately Cicero himself was never permitted to reach. As we know, he met a violent death, but had he been spared this and allowed to live out his natural span of life, the idea of old age at the time he wrote was certainly in the region of fifty. A person who reached the age of sixty was considered very old indeed. Whilst it is obviously difficult to get any accurate statistical data on the expectation of life in those times, it is fairly safe to assume from a study of the various sources of information that in the year 54 B.C., that is the date of the writing of *De Senectute*, the expectation of life was certainly under thirty years of age at birth. In classical ancient Greece certain tribes, particularly those in Sparta, were ruled by a collection of "elders" known as the geros, the word being derived from the Greek word *γέρων*, meaning old man. In order to be elected to the Gerontia a candidate had to be over sixty years of age, and when one remembers what we have already stated, namely, that in 54 B.C. the expectation of life at birth was only thirty, it can be well understood that anybody of sixty or over was regarded as being very old and, therefore, presumably very wise.

One does not need to go as far as ancient Greece for a consideration of rule by the "elders". Your own anthropologists have shown quite clearly that the aborigines of Australia were ruled in a similar manner to the tribes of ancient and classical Sparta. I believe I am correct in saying that under natural conditions it is very unusual to find an aboriginal much older than forty years of age and it was out of this group of the over-forties that the rulers of the tribe were always selected.

We have to go a long way from Cicero before we get any further reference to a study of old age. It is not proposed in this lecture to give anything like a complete account of the history of this subject and it may be that this brief review will miss a number of early publications. There are, however, only two which stand out with any degree of importance between the Ciceronian period and the modern times of the late eighteenth and early nineteenth centuries. The first book on the problem of old age appeared in the thirteenth century and was by Roger Bacon. It was translated from Latin by one Richard Brown and was published in the year 1683. This work deals with the physical changes occurring in old age and is mainly of philosophical interest.

The first English work to be published in what one might term the modern style, namely a study of old age from the medical point of view with observations on how to remedy, or attempt to remedy, some of its troubles, was written by a physician, Sir John Floyer. It was entitled *Medicina Gerocomica* and was published for the first time in the year 1724. Floyer was knighted for this contribution to the study of old age and he had a very extensive practice in Lichfield. The volume is a rare one and I was able to consult it in the library of the Royal College of Physicians of London. The author reduces his philosophical observations to a remarkable minimum, considering the period of time in which the book was written, and deals mainly with methods of alleviating some of the more characteristic sufferings of old age. He points to the value of exercise and diet and lays great stress on the importance of moderation as age increases. He criticises those who eat too much and is very much against overweight in middle and old age. He is very keen on massage and cold and hot rubbing in order to improve the circulation, and finally he is particularly anxious to avoid constipation and suggests the use of shale and mineral oils towards this end.

This book had a very wide circulation and was in fact the standard one for the instruction of physicians up to the nineteenth century. The great advances made in the nineteenth century in the care of sick people brought into sharp contrast the very difficult position of the aged poor as compared with similar subjects of a higher income group. Towards the middle of the century, active steps were taken by local authorities to provide almshouses and similar forms of provision for the aged, and the sick poor were accommodated in wards of charities specially devoted to the subject. It was not until the end of the century and the early part of this century that a really serious academic consideration of the problem of old age was instituted. We have to differentiate very sharply a study of the aged sick as compared with the so-called aged healthy, and it is more with this particular aspect of the problem that we are concerned in this lecture.

At the beginning of this century two new terms began to make their appearance in medicine; both were derived from the Greek already referred to, and one, known as gerontology, referred to a study of the process of aging from the purely academic point of view. In this science aging is considered as a natural phenomenon and the study of gerontology is in effect exactly the same as the study of physiology which studies the normal function of the normal body. The second subject is known as geriatrics and this is concerned with the methods of therapy to be applied to the various forms of disorders that occur in old people. In a way it is applied gerontology and is concerned entirely with the making of the lives of old people easier in that it attempts to relieve them of the burdens of the troubles that afflict them.

The trend of modern medicine and research has been to increase the expectation of life. We have already pointed out that in the classical days of ancient Rome, and before then, expectation of life at birth was probably under thirty years of age, and a careful inquiry into the information available seems to indicate that there is very little change in the expectation of life at birth until well past the Middle Ages; in fact there is really very little reason to expect any change, since the conditions in Great Britain and European countries in the Middle Ages were in many ways inferior from a health point of view to those in ancient Rome. The first big jump came towards the middle of the last half of the last century and this is undoubtedly due to the great improvement in the various public health reforms then undertaken. Thus in this period we saw the institution in towns of the water carriage system of sewerage and the universal supply of clean and guaranteed non-infected water, and as the result of this the great cholera epidemics that used to decimate the lower income groups of London and big cities had disappeared certainly by the 1870's.

From the year 1900 onwards we see a steady climb in the expectation of life until today at birth the expectation of life is over seventy years of age. The effect of this upon the population distribution is of the very greatest interest. It is not proposed in this lecture to go into sociological aspects of the subject in any detail, but the effect on distribution of the population by this change is of such importance that we must take notice of it.

Very briefly we can say that between 1900 and 1950 the result of the increased expectation of life has been a steady shift towards prominence of old people in the population. As you trace the years from 1900 to 1950 the percentage of people in the population of over fifty has steadily increased. Economists and sociologists tell us that if the present trend goes on we shall finish with a population in another fifty years in which old people far outnumber the younger ones, and the sociological implication of this is of course obvious.

Perhaps we may be permitted to digress for a moment at this stage to consider what are the causes of this increase in the expectation of life at birth with its consequent fundamental influence in the composition of society at any given moment. We can pick out very clearly a series of factors which have caused this. Firstly we can quote the introduction of antisera to certain types of pneumococcal infection round about the 1920's. The use of these sera produced a considerable fall in the death rate in pneumonia, with the result that the expectation of life was automatically increased and the proportion of old people obviously must be greater. A much greater increase in the expectation of life was caused by the introduction of the sulphonamide groups of drugs in the early 1930's. One of the most important of these was sulphapyridine or "M & B 693", which as we all know when administered by mouth provides almost complete protection from lobar pneumonia

and when administered even in a fully developed case will often and frequently cause a complete and rapid cure, when previously a fatal issue could only have been expected. It may be said that the sulphonamide drugs virtually banished a whole series of lethal infections of which the respiratory ones were the most important. Another significant bump in the curve was given by the introduction of the antibiotics in the period following 1940. Here again the respiratory infections received almost what amounts to a knockout blow, while many other complaints, such as septicæmia and virulent infections of various forms, were completely brought under control by the introduction of the antibiotics.

It must be remembered that we are only at the very beginning of the use of antibiotics on a large and wide scale. Their use is mainly confined to institutions, and there can be little doubt that preparations of these substances highly active by mouth will be discovered in the future and their application to general practice, and probably even out-patient practice, will be very considerable. We are, therefore, justified in assuming that there will be a continuous increase in the expectation of life and that this proportion of old people at any moment in a population will steadily increase as the years go on. The effect of this increase in the older population is shown very clearly by an analysis of the cause of death in the various years from 1900. In the year 1900 the greatest killers were five in number and are roughly the same today. They include heart diseases and cranial lesions of vascular origin, pneumonia and influenza, nephritis and finally cancer. In the year 1900 these five caused roughly half the deaths recorded. In the year 1910 heart disease leapt very considerably ahead, with the result that the big five now kill roughly 70% of the population. If we proceed with a similar analysis from the year 1910 to the present time, we find first of all that the respiratory infections and nephritis begin to lag behind as killers, but that cardio-vascular disease and intracranial vascular lesions and cancer begin to gain strength, and that by 1950 something like 80% of the deaths are caused by cardio-vascular disease, in its various forms, and cancer. Nephritis has dropped considerably and the respiratory infections have virtually disappeared.

The lesson of this is very important to planners of medical education and therapy since it shows that the doctor and nurse in years to come will have to deal mainly with cardio-vascular disease occurring in the aged, and of course at the present time with malignant disease. Whilst I am not in any way holding out any hope, and I can assure you have no hidden knowledge on the subject, I think with this reservation it is fair to say that one can hope that in the future cancer will yield its secrets in the same way that other dread diseases such as pernicious anæmia, diabetes and so forth have done. If the cure to cancer could be discovered and this disease eliminated, then cardio-vascular disease would be unrivalled as a cause of death and one could say that practically the whole of medicine of the future would be concerned with this condition.

We have, I think, dealt at sufficient length with the medical and sociological aspects of old age and I have only spent this amount of time on the subject in order to convince you that no one can afford to ignore the importance of the problem of the study of aging. Let us now turn to a consideration of the question of gerontology, in the first instance as an academic subject. The subject in relation to the human race is a very complicated one because senescence appears at different periods in the lives of various individuals. We all know the man of eighty who is active, alive to his job and right up to the mark, whereas we also know the prematurely aged man of fifty who is forgetful, lacking drive and in fact an old man. At the present time we have no knowledge as to the actual cause of the difference in the rate of senescence in individuals and perhaps we should turn at this stage to a consideration of the theories of the aging process. A great deal has been written on this aspect of the problem, and as most of it is pure speculation and is not based on academic investigations and laboratory work, I do not propose to review it in any detail. If you are interested in a detailed study of senescence in the various species of nature you can find an exhaustive account in the well-known book by Professor Cowdry. There is, however, one great argument that has troubled all students of gerontology, namely: is the aging process due to the failure of some central controlling mechanism or is it a gradual somatic disintegration, so to speak, a wearing out of the whole machine?

If we take an analogy of a motor-car we know that old age or senescence in this machine is due to the affliction of certain parts with excessive wear; for example, the tires will give out quite early and the bores of the cylinders will begin to be worn and finally the engine will lose power and come to a standstill. Is man's trouble like this? Is it due to the wearing out of the various parts of the body, or can it be explained by the failure of some central mechanism which results in a degenerative process occurring in the various organs of the body?

Let us consider these theories in detail. Let us take the central failure hypothesis. The one organ which controls more other parts of the body than any other is, of course, the pituitary and this has been known now for over roughly half a century. We know that the pituitary in its anterior lobe secretes a whole series of hormones which are responsible for controlling the other endocrine organs of the body. An operation now easily performed in a number of laboratory animals is followed by a prompt cessation of activity in a large number of the organs of the body. Thus the sex glands of both male and female cease to function and a degenerative process begins in the secondary sexual characteristics with a reversion to the infantile type. Changes occur in a great many other organs, more particularly the suprarenal and the thyroid gland, and all of these morphological changes are attended by reduction in their activity. In the early part of this century a German physician, Professor Simmonds, described a series of cases of premature aging which now bear his name, namely Simmonds's disease. In this condition a sudden aging process comes on people usually under forty and in a few months from being a healthy man or woman they are reduced to a state of extreme emaciation, with complete loss of hair, peculiar wrinkling of the features, lassitude and, in fact, the appearance of extreme age and decreptitude. At post-mortem examination it was shown that this syndrome was associated with destructive lesions of one form or another of the anterior lobe of the pituitary. We also know that removal of the pituitary in the human subject for tumours *et cetera* is followed by what is now known as a surgical Simmonds's disease, and this condition can appear to be very similar to the one occurring naturally, although it is never quite so severe as the surgeon always aims at leaving some anterior lobe tissue if he possibly can.

These observations, together with those of the effect of hypophysectomy on the laboratory animal, have led some people to infer that the aging process is in effect similar to hypophysectomy. Whilst there is some superficial support for this theory, it can at once be discounted as a major explanation of the phenomenon of aging. To commence with, hypophysectomized animals, if well tended in the laboratory, will live just as long as the normal control animals, and, whilst they show certain characteristic changes such as cessation of cyclical sexual activity, they do not show any of the characteristics of old age. In fact, they age at the same rate as their control litter mates in the laboratory, and we must, therefore, conclude that the symptoms of their hypophysectomy are in no way connected with the aging process. Again, a careful consideration of the symptomatology of Simmonds's disease, though resembling some of the aspects of extreme senescence, does not really present a picture of the normal aging process, even if one considers it as an accelerated process. We must, therefore, abandon the pituitary failure hypothesis. If we turn to other organs we again find no evidence that would support any theory that would ascribe senescence to a failure of one particular part of the body. If we take the stomach, for instance, there have been many careful

studies of gastric function in old age. These have shown that the incidence of achlorhydria increases as age goes on until when one gets over the seventies and eighties it is very common indeed. But this does not mean that the subjects suffer from digestive disturbance, or that their nutrition is in any way impaired. Careful surveys of people in old age establishments reveals that by far the greater part of them possess a hearty appetite and are in a really good state of nutrition as judged by their weight, hæmoglobin and so forth. A study of renal function again shows that renal efficiency improves at first as age goes on. It has been shown quite clearly that the infantile kidney and the fœtal kidney before it are very inefficient organs as compared with the adult kidney. Statistical studies have shown that there is a tendency for the renal efficiency to fall with very great age, but in normal senescent subjects this fall is certainly not sufficient to account for any symptoms. The same applies to the cardio-vascular system, and, provided that this is not subject to any secondary changes such as arteriosclerosis *et cetera*, the diminution in cardiac output with age is certainly not sufficient to account for any of the symptoms. If we consider the basal metabolic rate, which, after all, is a measure of the sum total of all the body's activities when at physiological rest, we can see definite changes in this measurement. The metabolic standards, as judged by respiratory exchange, are very well known from groups of normal individuals between the ages of twenty and sixty, but below the age of twenty and above the age of sixty the actual numbers of subjects investigated begin to trail off, with the result that when one gets to the extreme ends of the life span, namely, let us say, below ten and over seventy, there are very few accurate observations on which to base one's calculations of normality. Isolated observations on the metabolic rate of very old people, even up to a hundred, have been made and, of course, are of value, but the danger of using single observations as a basis of calculation for normality is so obvious as not to require stressing. There is, however, a consensus of opinion that, as age increases, the basal metabolic rate tends to fall. The figures obtained for persons over eighty are usually some 15% to 25% lower than those of people between the ages of twenty and sixty. This, however, does not indicate any general cause of senescence and in fact the raising of the basal metabolic rate by the administration of thyroid extract does not produce any rejuvenating effect.

Turning to the more modern methods of investigation, the excretion of urinary steroids in various stages of senescence has been studied with great care. Here again it has been shown that the total steroids of the urine show a steady decrease as age increases, but that there is no significant alteration in the pattern of distribution of the various constituents. This again would support the view that senescence is not due to any sudden change in the function of any organ of the body, but is due to some gradual slowing down of metabolic processes in general.

There is one aspect of biochemical research which has to my knowledge never been applied extensively to the study of aging and that is the metabolism of the body proteins. Before the work of Schoenheimer, it used to be thought that the body proteins were stable substances laid down at the beginning of life and remaining there till death. When Schoenheimer introduced the use of tagged or labelled elements to the study of metabolism he was able to show that if he fed amino acids with labelled nitrogen to animals, this labelled nitrogen entered into the protein constituents of their body. What he was also able to show to the astonishment of the scientific world was that the tagged or labelled nitrogen disappeared after various periods from the proteins of the body. This could be explained only by assuming that there was a resynthesis going on of protein which presumably was continuously being broken down. This concept of the dynamic equilibrium of complex structures like proteins has led to a complete revolution in our views in relation to the composition of the body. We now believe that all tissues of the body are in a constant state of being replaced by new elements and building material. At the present time we have no knowledge as to the controlling mechanism of this potential resynthesis and one cannot help wondering whether this is in some way bound up with the problem of senescence. Might it not be that, as age increases, this rebuilding and resynthesis of tissues slows down with the result that senescence appears. Experiments are now in progress in a number of centres to investigate this important aspect of the subject.

To many, and particularly to uninformed sections of the public, the subject of the study of aging is really a method of trying to provide rejuvenation, and it might perhaps be worth while to say a word about this subject. From time to time many scientific workers have claimed that they have produced evidence that the administration of certain substances was capable of either retarding the effects of senescence or of actually reversing the process so that old people could be made to look and behave like younger ones. A careful investigation of these claims shows that almost universally they can be reduced to an administration of some form of the sex hormones. Now recently, that is to say since 1930, the physiologists, the biochemists and the clinicians have been able to handle very powerful sex hormones which were quite unknown and unavailable to workers before this date. The constitution of the male and the female sex hormone is now well known and these substances can now be procured in a crystalline state, in forms suitable for administration to the human subject, at prices which are within the reach of ordinary pockets. It can be said at the outset that the most careful investigations failed to reveal that the employment of either testosterone propionate or the various œstrogenic substances has any effect whatsoever on the aging process. Indeed, all laboratory experiments prove conclusively that castration of either male or female, attended by a cessation of the sexual activity, has no effect at all on the aging process; in fact it is well known that eunuchs age at the same rate as normal men, although, of course, they may still retain some of the earlier prepubertal characters. Other hormones have been recommended in addition to the sex hormones, but careful investigations show that none of these produce any rejuvenating effect.

We must admit that at the present time we are without any means of controlling the rate of appearance of this condition. Not only does this apply to the use of hormones, but the various levels of vitamin intake have been studied in old people. Again a very careful statistical inquiry has shown that greatly increasing the intake of the vitamins *A*, *B*, *C*, *D* and others has been without effect on the condition. What, then, is the solution to this problem? Only one, I fear, and that is to obtain recognition for research work into the cause of aging. Many lines could be followed, particularly, I think, the line of studying the protein metabolism of isotopes in old age.

All the previous orators who have dealt with the life of Professor Halford have indicated that he reached his four-score years and retained in every way his faculties and interest. Therefore, I feel that he would approve of this plea for the recognition of this branch of applied physiology and biochemistry.

I should like to bring this subject to a close firstly with an expression of my thanks to the university for asking me to deliver it, and finally with a quotation of the end of *De Senectute*:

> Again, if we are not going to be immortal, nevertheless, it is desirable for a man to be blotted out at his proper time. For as Nature has marked the bounds of everything else, so she has marked the bounds of life. Moreover, old age is the final scene, as it were, in life's drama, from which we ought to escape when it grows wearisome and, certainly, when we have had our fill.

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# MASS X-RAY SURVEYS IN NORTH AMERICA.

By ANTHONY PROUST,[1]
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Mass chest X-ray surveys are now a common phenomenon in North America. Three of these surveys, carried out by the use of the photofluoroscopic technique in widely separated areas, are discussed. An attempt is made to evaluate each as a case-finding method for pulmonary tuberculosis (Province of Manitoba, Canada, 1946-1951), for cancer of the lung (Boston, Massachusetts, 1949-1950) and for cardiac disease (Cincinnati, Ohio, 1949).

## Mass X-ray Surveys in Manitoba: Incidence of New Active Pulmonary Tuberculosis.

The Province of Manitoba lies in the Canadian Mid-West. It has an area of 219,000 square miles and a population of 795,000, divided equally between urban and rural. The great majority of the urban population is in Greater Winnipeg (population 330,000), which is a trading and manufacturing centre. Agriculture, manufacturing, minerals and fur-production are the Province's sources of income. The racial origins of the population are 50% Anglo-Saxon, 20% West European, 14% Ukrainian, 7% French-Canadian, 2·5% Jewish and 2% Indian.

In 1945, the year before mass X-ray surveys were begun on a systematic and sustained scale throughout the Province, the white tuberculosis death rate was 25·3 per 100,000. In 1951, after five years of surveys, the white death rate had fallen to 14·7 per 100,000 after having reached the figure of 14·2 per 100,000 as early as 1949. In 1945, of all new active cases of pulmonary tuberculosis, in 25% the condition was minimal.[2] In 1951, this figure had risen to 50%. During the same period, 1946 to 1951, the morbidity from pulmonary tuberculosis fell from 46·2 per 100,000 to 26·3 per 100,000.

Mass surveys were begun in 1946 on a scale designed to cover the whole population of the Province over a two-year period. Prior to this, case-finding programmes had been carried out on a smaller scale, as far back as 1926, mainly by hospital and mobile clinics. The mass surveys beginning in 1946 were organized and carried out by the Sanatorium Board of Manitoba, established by Provincial statute, in cooperation with federal, municipal and industrial authorities. From 1946 to 1949, the whole Province was covered twice. Over the years 1950 and 1951, the surveys were focused on areas and groups which had, in previous years, provided significant numbers of new cases. Over the period 1946 to 1951, approximately 1,300,000 microfilms were taken in mass surveys.

During the period under review, the discovery rate of new active cases has fallen from nine per 10,000 survey films (1946) to three per 10,000 in 1951. However, in 1951 mass surveys uncovered 33% of all new active cases, in 75% of which the lesions were minimal in extent. The real economy of the surveys is related to early diagnosis of minimal disease, which presents a relatively simple therapeutic and public health problem.

Other case-finding programmes in the Province uncovered 66% of the new active cases reported in 1951, in only 37% of which were the lesions minimal. These programmes have four aspects, as follows.

### *Stationary Chest Clinics.*

The six stationary chest clinics are at the out-patient departments of the tuberculosis hospitals in the Province. Patients are referred by their own physicians because of symptoms, or are contacts, suspects or "follow-ups" on file at the Central Tuberculosis Registry at Winnipeg. The discovery rate was approximately 160 new active cases per 10,000 films taken in 1951.

### *Travelling Clinics.*

The travelling clinics provide a chest consultation service for physicians in rural areas. The discovery rate in 1951 was approximately 30 new active cases per 10,000 films taken.

### *Hospital Admission X-ray Examinations.*

Hospital admission X-ray examinations covered 31 hospitals receiving over 80% of the Province's patients admitted to hospital. On the average, 66% of these patients were actually radiologically examined. The discovery rate was 12 new active cases per 10,000 films taken in 1951.

### *Hospital Out-Patients and Staff.*

Out-patients were radiologically examined on registration as a routine measure. The discovery rate of new active cases was approximately 15 per 10,000 films. Members of hospital staffs were radiologically examined every six months throughout the Province. No new active case of pulmonary tuberculosis was diagnosed in 3400 examinations in 1951.

### *Summary.*

Mass X-ray surveys on a sustained basis have been carried out in the Province of Manitoba over the years from 1946 to 1951.

These surveys have been associated with a decline in mortality and morbidity from pulmonary tuberculosis. The incidence of advanced disease has declined, presenting an easier problem in therapy, public health and rehabilitation. A change in policy is noted from surveys at random (1946

[1] Formerly Assistant Physician, Sanatorium Board of Manitoba, Canada.

[2] According to Diagnostic Standards and Methods of Classification, National Tuberculosis Association, 1940.

TABLE I.

*Influence of Mass Surveys on the Diagnosis of Pulmonary Tuberculosis in Manitoba.*

| Year. | Number of Mass Survey Films. | Total Cases of New Active Pulmonary Tuberculosis.[2] | Number of Cases of Minimal Lesions. | Minimal Lesions: Percentage of Total. | Moderately Advanced Cases. | Far Advanced Cases. | Death Rate per 100,000. | New Cases per 100,000 X-ray Films. |
|---|---|---|---|---|---|---|---|---|
| 1938 | — | 317 | 78 | 25 | 104 | 135 | 26·5 | 44·0 |
| 1940 | — | 295 | 83 | 28 | 106 | 106 | 28·5 | 41·0 |
| 1945 | 50,520 | 342 | 127 | 37 | 111 | 104 | 25·3 | 46·2 |
| 1946 | 108,742 | 359 | 139 | 39 | 141 | 79 | 24·5 | 49·6 |
| 1947[3] | 259,271 | 338 | 140 | 41 | 93 | 105 | 21·0 | 45·4 |
| 1948 | 235,446 | 322 | 114 | 35 | 94 | 114 | 19·7 | 42·5 |
| 1949 | 222,919 | 274 | 117 | 42 | 76 | 81 | 14·2 | 35·2 |
| 1950 | 170,402 | 216 | 96 | 44 | 57 | 63 | 13·8 | 27·5 |
| 1951 | 240,110 | 211 | 105 | 50 | 50 | 56 | 14·7 | 26·3 |

[1] Mass surveys began on a planned Province-wide scale in 1946. Prior to this, localized mass surveys had been carried out. No large increase in new active cases followed the mass surveys. A sustained rise in the relative incidence of minimal cases did follow.

[2] Mass surveys were responsible for only 25% to 33% of this total for any year 1948 to 1951. However, in 1951 the mass surveys were responsible for over 50% of the minimal cases diagnosed.

[3] Population of Manitoba in 1947, 743,000.

to 1949) to surveys focused on areas and groups of proven morbidity (1950 to 1951).

Other case-finding programmes are listed with an indication of their effectiveness. The remarkable absence of new active cases among hospital personnel is noted.

Future policy of mass X-ray surveys is being critically reviewed (Ross). The immediate plan is to continue with surveys of areas and groups of proven morbidity.

### Mass X-ray Surveys in Boston: Incidence of Cancer of the Lung.

Scamman (1951) has reported on the role of a mass X-ray survey in diagnosing cancer of the lung in Boston. The survey was scheduled primarily for the detection of pulmonary tuberculosis. Prior to the survey, a committee of thoracic surgeons was set up whose special interest was cancer of the lung. Staff, including two medical social workers, and office space were reserved for this committee by the survey organization. Microfilms which, in the opinion of the radiologists reading the films, suggested cancer of the lung were referred to the committee. The cancer suspects were then visited by the medical social workers and an appointment was made for a large X-ray film of the chest to be taken. If it was indicated in the opinion of the committee, the patient was then referred either to the physician of his choice or to a chest clinic for final diagnosis. Intensive follow-up by the medical social worker ensured attendance. The median period from the date of the taking of the microfilm to the date of final diagnosis was seven weeks. The results were as follows:

| | |
|---|---|
| Total microfilms taken .. .. .. .. .. .. | 536,012 |
| Total suspects referred to cancer committee .. | 9372 |
| Total in which an abnormality was confirmed after a large film had been taken .. .. .. | 7254 |
| Cancer suspects referred for final diagnosis .. | 398 |
| Total who proceeded to final diagnosis .. .. .. | 343 |
| Final diagnosis of lung cancer (primary 43, metastatic 15, presumptive 15, others 3) .. | 76 |

In the cancer suspects who proceeded to final diagnosis and who did not have cancer, a wide range of pulmonary disease was reported, including tuberculosis, bronchiectasis and pulmonary cysts.

Another nine cases of cancer of the lung were diagnosed among those subjects whose films had been originally read as tuberculosis and who were followed up as such for diagnosis.

An analysis of the figures in the reports reveals the following findings:

1. The highest correct index of suspicion was in males aged fifty years or over. Between the ages of fifty and fifty-nine years, 39% of the male cancer suspects referred for diagnosis were proved to have cancer of the lung.

2. In younger groups, the correct index of suspicion fell to 4% in the age group up to twenty-nine years and to 11% in the group thirty to thirty-nine years.

Of the 85 patients with lung cancer, 22 were considered operable. This compares unfavourably with the 33% of nearly 1000 patients examined in Ochsner's clinic in New Orleans (Ochsner *et alii*, 1952), most of whom were referred for diagnosis on the basis of symptoms.

*Summary.*

A lung cancer survey was carried out in Boston, Massachusetts, in 1949 and 1950 in conjunction with a mass survey for pulmonary tuberculosis.

The incidence of all types of lung cancer in the mass survey was 16 cases per 100,000 microfilms. The highest correct index of suspicion was in males of the fifty to fifty-nine years age group.

Despite the presumably early and asymptomatic stage of many of these cancers, there was no significant increase in operability of the lesions as compared with the series from Ochsner's clinic in New Orleans. In view of this and of the cost, time and organization necessary for such a survey, it would appear that no great benefit accrued.

### Mass X-ray Surveys in Cincinnati: Incidence of Heart Disease.

Schwartz and Berman (1952) have reported a survey of the incidence of heart diseases in a mass X-ray survey of over 10,000 adults in Cincinnati, Ohio.

Cincinnati has a population of 500,000 (city limits), 20% of whom are Negroes. One could expect a higher incidence of syphilis by serological tests than in a similar group in Australia.

The primary aim of the mass X-ray survey was the detection of pulmonary tuberculosis. The staff and services of an existing cardiac clinic were used to detect radiological evidence of heart disease, and then in the follow-up and clinical evaluation of the suspects.

The survey covered 10,549 persons, and 486 (464 per 10,000) showed some abnormality of the cardiac and aortic silhouette in the microfilm examination. This corresponds closely to the 507 such abnormalities per 10,000 microfilms noted among 97,662 hospital admission X-ray films in Manitoba, in the period from 1949 to 1951.

Of the 486 subjects presenting abnormalities, a random selection of 207 was made, 60% of whom were white, 40% Negro. All adult age groups were represented, 58% being in the group fifty to seventy years. This group of 207 were subjected to a history-taking and physical examination, the taking of a large chest X-ray film, a fluoroscopic examination, an electrocardiographic examination and a serological test for syphilis.

Of this group of 207 suspected of having heart disease on the basis of abnormal cardiac and aortic silhouettes in microfilms, 177 or 85% had definite organic heart disease according to the criteria established by the American Heart Association. The organic lesions were listed as follows: (i) 117 subjects had hypertension, the blood pressure being over 150 millimetres of mercury, systolic, and 100 millimetres, diastolic; (ii) 55 had cardiac enlargement, in most cases associated with hypertension; (iii) 62 had abnormal electrocardiographic findings—either arrhythmias, coronary vascular changes or left ventricular preponderance; (iv) 18 had rheumatic heart disease; (v) eight had aortic aneurysm.

Of the 177 persons proved to have organic heart disease, 91 (52%) stated that they knew they had heart trouble, and 86 (48%) professed ignorance.

Schwartz and Berman concluded that if all suspects had been fully investigated, a total of approximately 415 cases of proven heart disease would have been found in the 10,549 persons in the survey (395 per 10,000).

*Summary.*

A survey of heart disease on the basis of abnormalities in mass chest X-ray films was carried out in Cincinnati in 1949, in conjunction with a tuberculosis survey.

The incidence of organic heart disease by this method was 395 per 10,000 films. Approximately half of the subjects with organic heart disease were unaware of their condition. No mention was made of symptoms in this group.

Approximately 85% of those who were thought to have abnormal cardiac and aortic silhouettes in the microfilm were later proved to have organic heart disease. The vast majority of these subjects appear to have hypertensive cardio-vascular disease.

This survey was a relatively small one, and the staff and services of an existing cardiac clinic were used for follow-up and final diagnosis of the suspects. The feasibility of a larger survey, especially in cities without existing public cardiac clinics, is doubtful. The incidence of serious unrecognized heart disease in the population is low. The desirability of uncovering this, especially when it is asymptomatic and no specific therapy is required, is open to serious doubt.

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## A NOTE ON LEPROSY AS AN ÆTIOLOGICAL FACTOR IN THE WEBER-CHRISTIAN SYNDROME.


By J. H. W. BIRRELL,[1]

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THE Weber-Christian syndrome or relapsing febrile non-suppurative nodular panniculitis is a condition characterized by recurrent bouts of fever associated with the formation of single to multiple crops of tender or painless inflammatory nodules in the *panniculus adiposus*.

Recently the writer published a case of this syndrome, typical in all respects, in a male Maltese, aged thirty-seven years, who had been for two years resident in Australia (Birrell, 1952). He complained of fever associated with the appearance of a number of subcutaneous nodules for some eighteen days before his admission to hospital. He had suffered one similar episode four months previously. After clinical assessment and the performance of necessary laboratory investigations, a nodule was excised for histological examination. This was reported as consistent with a diagnosis of the Weber-Christian syndrome.

Shortly after the publication of this case another Maltese presented at the Alfred Hospital showing a very similar clinical and histological picture (Mancy, 1953). Leprosy was suggested in this second case, and Ziehl-Neelsen staining was carried out on biopsy material from one of the nodules. The finding of organisms typical of *Mycobacterium lepræ* in this second case immediately led to a reexamination of the biopsy from the first case and to the discovery in it of similar organisms.

Hence we are faced with a typical example of the Weber-Christian syndrome from the lesions of which *Mycobacterium lepræ* has been isolated.

The histological picture of the early lesions of the Weber-Christian syndrome shows the interstices of the fatty tissue of the *panniculus adiposus* more or less heavily infiltrated by leucocytes of various types, with separation and partial or complete disappearance of fat cells. Atrophy and even necrosis of fat cells can be seen.

Large foam-like cells are also found in considerable numbers. Some of these are certainly macrophages, but others may conceivably be fat cells which have become amœboid and phagocytic. Multinucleated giant cells are occasionally encountered, and there is also proliferation of local fibroblasts and reticulum cells.

The inflammatory process is limited mainly to the immediate vicinity of fat lobules, but the intervening fibrous tissue septa often show œdema and infiltration with round cells. Eventually, in the later stages the fat cells are replaced by scar tissue, which results in dimple-like skin depressions. In the skin over these areas increased pigmentation is often seen.

It will be seen that the pathological changes which occur in this syndrome are non-specific. For example, one can reproduce similar changes experimentally by traumatizing guinea-pig subcutaneous tissues with forceps, as well as by a host of other methods.

Leprosy of the "lepromatous" type in a relatively early stage appears essentially as a chronic granulomatous infection. The dermis shows granulomatous tissue masses which are composed of many cells with a foam-like appearance, lymphocytes, epithelioid cells and fibroblasts, together with some giant cells. In leprosy, however, the foam-like cells frequently contain clumps of leprosy bacilli.

It is noteworthy that iodides and bromides have not infrequently been mentioned as ætiological or precipitating factors in the Weber-Christian syndrome; Bailey's (1937) five patients had all been taking iodides or bromides. Since iodides are known to be inimical to leprosy, this emphasizes further a relation between leprosy and some cases of the Weber-Christian syndrome.

The implication of the foregoing is that the Weber-Christian syndrome is only a syndrome and not a specific disease, and that leprosy may well be one of the ætiological agents.


### Summary.

A patient previously diagnosed as suffering from the Weber-Christian syndrome has been found to be actually suffering from leprosy.

It is suggested that a proportion of cases of the Weber-Christian syndrome may actually be cases of leprosy in a relatively early stage.



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## HUMAN ENGINEERING: A NEW TECHNOLOGY.[1]


By J. C. LANE,

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ACCORDING to Wiener the engineers of ancient days were land surveyors, astronomers and navigators. The mechanical engineers of the seventeenth and early eighteenth centuries were clockmakers and grinders of lenses. The chronometer was succeeded by the steam engine, and in the nineteenth century and early twentieth century the central field of engineering has been the study of prime movers. In the past few decades power has come to be used in a more subtle manner than as a means of doing work, and the present time is the age of communication and control.

When an engineer sets out to design a communication or control system, he needs to have precise information about the performance characteristics of the electronic and mechanical elements that comprise it. Often such systems have one or more human operators as links, and the designer therefore needs also to know the appropriate operating characteristics of the human operators.

Recent developments of theory permit the consideration of control and communication systems in a quite general manner, whether they are mechanical or electrical, or whether they occur in the nervous or endocrine system of animals. The analytical approach, which has come to be known as the information or communication theory, is especially associated with the name of Shannon, and the synthesis called cybernetics with the name of Wiener.

Until quite recently it was accepted that the equipment a human operator had to use was fixed by engineering considerations only and was not thereafter open to change. Efforts to secure better man-machine performance were

[1] Read at a meeting of the Section of Public Health, Industrial Medicine, Tropical Medicine and Aviation Medicine, Australasian Medical Congress (British Medical Association), Eighth Session, Melbourne, August 22 to 29, 1952. This paper is published with permission of the Director-General of Civil Aviation, but the opinions expressed are those of the author and are not necessarily held by the Department of Civil Aviation.

made by selecting operators with especially good aptitude or by giving them extensive training on the task. This is a rather wasteful procedure, because a proportion of potential operators must be rejected, because the selection process and training have to be kept going, and because, in spite of all this, the overall results may be below expectation. Generally speaking, selection procedures are expedients because, so it is often said, it is too late to alter the design of the equipment. This approach reached an absurd end point when it was found that an optical instrument built for one of the services could be operated satisfactorily by only three out of every thousand persons.

Since it is difficult to modify substantially a man's operating characteristics, it is more practical to design the equipment so that its points of interaction with the operator are matched to the man's capacities.

During the second World War the need for getting efficient performance out of communication and control systems containing human operators brought into being a field of study known variously as ergonomics, biotechnology and work space design, but perhaps best as "human engineering". Human engineering is a blend of various biological sciences—physiology, anatomy, physical anthropology and especially applied experimental psychology, together with various branches of engineering. It aims to determine human capacities, to provide principles governing the design of machines for efficient human use, and to ensure an effective integration of man and machines for the accomplishment of an overall task.

Though one of its practical objectives is to provide the basic data that will permit engineers to design equipment which is adapted for efficient human use, another is to help engineers decide which parts of a particular job are best performed by machines and which are best performed by men.

Machines are superior to men, according to Fitts (1951), in the following respects. The first relates to speed and power; at best a man needs 0·1 second to respond to a stimulus, and in complex situations, flying an aircraft, say, the reaction time may be as long as 1·5 seconds. Machines can be made to respond much more quickly than this, and with much greater power than a human can produce. Machines do not become bored and inattentive, and consequently in routine tasks can be made to respond not only more quickly but more uniformly.

Computation can be done more quickly and more accurately by machines, as the widespread use of business machines and the development of high-speed digital and analogue computers bear witness. For short-term memory, machines can be made which can out-perform men not only in storing data, but, what is often as important, in completely erasing that memory when it is no longer required. Finally, a suitably designed machine is capable of carrying out simultaneously more than one activity requiring some degree of attention.

On the other hand, human operators are superior to machines in a number of important respects. The functions of hearing and vision can operate at lower thresholds than any machine so far devised. The ear can very nearly detect the noise due to molecular movement, and some photoreceptors in the retina can be "triggered" by a single quantum of incident visible radiation. (On the other hand, the spectrum of vibrations and radiations we can detect is limited.)

Humans are superior in perceptual abilities, especially in generalizing from a stimulus. The human operator is very good at grasping complex situations quickly, especially if the data are presented to him in a suitable way. Another special quality is the human's extraordinary ability to improvise, whereas a machine can attempt as many different kinds of solution as its designer built into it and no more. A human operator can thus provide insurance against complete breakdown of a system in emergencies.

In two more functions the human is superior to the machine: the first, the ability to store very large amounts of information and to recall what is required when it is required, so permitting the faculty of judgement; the second, the ability to reason inductively.

Often it is necessary to provide against the possibility of failure or errors in a system by having its performance constantly checked, or "monitored" as the phrase goes. The relationship which has nearly always been used is that of a man monitoring the performance of a machine. Now the hypothesis has been seriously proposed, though it has not yet been adequately tested, that, in general, machines should be used to monitor men and not *vice versa*.

An example of this is given by a piece of equipment now being introduced into the air traffic control system. When an aircraft is approaching an airfield where it is to land, its ground control is handed from an arrivals controller to an airport controller, so that information also must be handed from one controller to the other about which altitude the aircraft is to be assigned. In this particular equipment the transfer is made by plugging a small card-

FIGURE I.

The altitude assignment board, a machine which monitors a human operator. Strips marked with the aircraft symbol and other data are plugged in to the rack near the operator's right hand.

holder, carrying the aircraft's symbol, into a board showing the altitudes. If one controller plugs an aircraft into an altitude which has already been assigned to a different aircraft by the other controller, an alarm sounds. Thus the machine is "monitoring" safe performance by the human operator.

In contrast to this, there is under consideration a system in which the handling of an aircraft on its final approach and landing under conditions of bad visibility will be an entirely automatic process. Navigation information will be obtained from a radio device and passed directly to the automatic pilot. The human pilot is supposed to look on, checking the aircraft's attitude and progress from a visual display and taking over if anything seems to be going wrong. Without going into the other technical pros and cons of this scheme, we may note in the present context that here we have a human operator "monitoring" a machine, and this is probably an undesirable relationship, especially since the man cannot keep in practice if the machine normally does the work.

Many problems have to do with the display of information to an operator. The word "display" is here used in quite a general sense—the manner in which the information is to be encoded and to what sensory channel it is to be presented. Quite often an important point in designing a display is to eliminate irrelevant information, which may overload the operator's ability to organize incoming data.[1]

By appropriate design of visual displays it is possible to improve efficiency by factors of 100% to 1000%. For

[1] Dr. Lane illustrated his paper with a number of slides projected on the screen.

example, inquiry about aircraft instruments misread by pilots showed that the conventional altimeter, which has three pointers, was frequently misread, often by amounts of 1000 feet, a very hazardous kind of error.

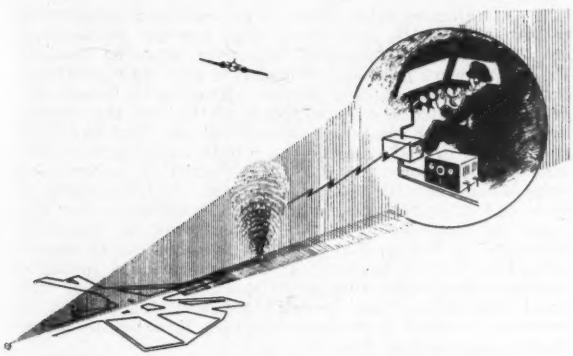


FIGURE II.

Automatic landing. Information about the aircraft's flight path is obtained from the radio beams (shown by the grids of lines) and passed directly to the automatic pilot. The human pilot acts as a monitor.

The presentation problem in an altimeter is in covering a very wide range of values. A great improvement in readability can be achieved by a dial in which thousands

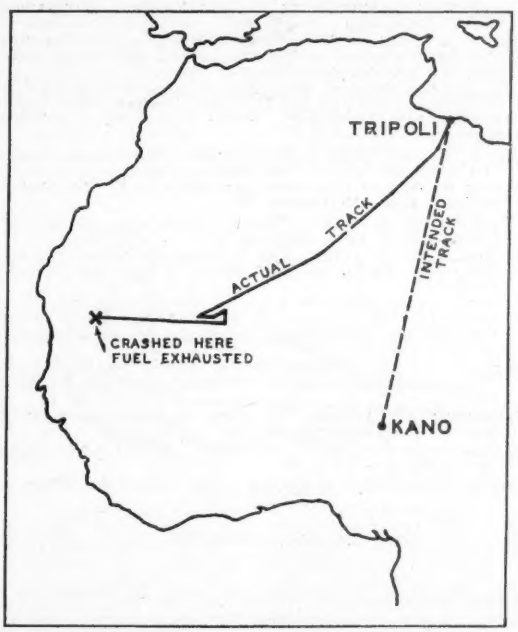


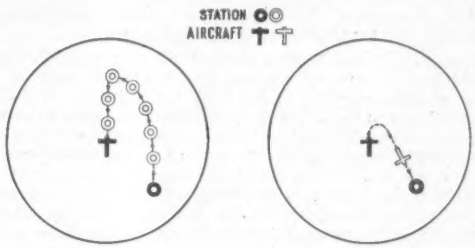

FIGURE III.

Shows the intended and actual tracks of a passenger aircraft on a scheduled flight which finally crashed. The aircraft's getting lost was primarily due to the navigator misreading an ambiguous dial—he thought he was setting 6° on the compass variation setter when he actually set 60°.

and tens of thousands of feet are shown by a counter in the main dial, the single pointer of which shows hundreds of feet only.

Indicators with two pointers on the same dial are especially apt to be misread, because our great familiarity with clock dials makes us tend to read any two-pointer dial as though it were a clock. There is a story concerning a pilot who was flying a type of jet aircraft with which he was unfamiliar. He looked down to check his air speed and found that he was flying, so he afterwards said, at a speed of "half-past three".

When the information to be displayed concerns the movement of an aircraft in relation to the ground, it has been found that a pictorial display—that is, a representation of an aircraft moving in relation to something like a map—is




"-TURN RIGHT AND FLY TO THE STATION"

FIGURE IV.

The pictures show successive appearances of two navigation displays when the pilot obeys the command "turn right and fly to the station". The right hand one is much the better.

superior to a symbolic display in which the same information is presented as letters and numerals. There are several radio-navigation systems in which it is possible to compute the aircraft's position as a direction and distance from a ground station. Now this information can be presented pictorially to the pilot in two ways. One shows the aircraft movement as seen from the ground station, and the other shows the apparent movement of the station as seen from the aircraft. It has been found that the

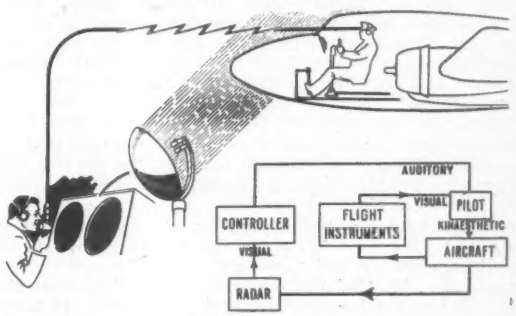



FIGURE V.

The ground-controlled approach system for bad visibility landings has two linked servo loops containing human elements.

station-centred display can be used to solve navigation problems with only one error in every five problems, in an average time of twenty-one seconds, compared with four errors in every five problems for the aircraft-centred display with an average time for solution of two minutes thirty seconds.

These examples have been of visual displays because they happen to be easiest to show on the screen; but other comparable findings have been made for auditory displays, with special reference to radio communication, and in the design of manual controls—switches, knobs, levers, wheels, pedals and so forth—for most efficient human operation.

The operator's task need not be especially complex for human engineering to be of benefit. Information about the best scales for accurate reading has been usefully applied to ordinary machine tools. Office and even domestic furniture design would be improved by the use of anthropometric and anatomic data, such as those of Åkerblom.

Studies on the change in human performance on repetitive tasks when two factors are varied—the speed (the number of items per unit of time) and the loading (the number of separate sources of demands for attention)—have been found to be applicable to tasks as diverse as controlling air traffic and looking after cotton-winding machines. Incidentally, they have thrown doubts on the validity of some of the "principles" (really assumptions) which are the basis of time-study methods.

An especially interesting aspect of this subject lies in the design of control system, in which a part of the output of the controller is fed back to its input. This kind of mechanism is termed a servo-mechanism. The technology of such control systems has been very extensively developed in recent years for use in aeronautics, in gunnery and in industry generally, and its theoretical analysis is of considerable physiological interest because of the very extensive use of servo-controls in the human body, for ensuring homœostasis, for automatic physiological functions and in the nervous control of voluntary activity. Interruption of servo loops in voluntary muscular control causes malfunctions familiar as ataxia or intention tremor. Human engineering is particularly concerned with servo loops in which one or more human operators are used as links.

As an example from aviation, we can examine the ground-controlled approach system for low visibility landings. Here we have two interconnected loops with human links, one with one human operator and the other with two.

In the application of human engineering to design problems we have to overcome a number of resistances. The first of these is the widely, if tacitly, held ambivalent view that everyone knows all about human behaviour or alternately that it is too diverse and complicated for measurement. Sometimes moralistic views are taken—for example, that errors are wilful. "Carelessness" is a convenient diagnostic waste-basket.

When taxed about an instrument with built-in reading errors, like the three-pointer altimeter, people sitting behind a desk are apt to remark "But surely pilots can read it". This is reminiscent of the experts who go to inspect a level-crossing after some particularly macabre collision and say "It seems perfectly safe to us"—disregarding the record which shows that there have been perhaps eight previous collisions at the same spot.

Occasionally people have been heard to assert that one ought not to make instruments easy for the pilot to read, because hard-to-interpret equipment is, in some recondite way, "good for him".

It often happens that evaluation of equipment in the early prototype stage is carried out by the designers, who use themselves or their assistants as operators. This is open to the risk that the designers may fail to appreciate some of the shortcomings of their creations. Moreover, engineers are generally more intelligent and more highly trained than the person who will finally come to operate the equipment, and the equipment as operated by engineers will perform far better than it later does in actual use. Similar criticism may be directed to the evaluation of user aspects of aircraft and airborne equipment by highly skilled test-pilots.

To obtain reliable appraisal of equipment under development, the subjects used in the tests must be representative of the population of operators who are ultimately to use the equipment. Moreover, the test must be carried out in the kind of setting that will occur in the real job. Finally, if it is at all practicable the test should be carried to the point of breakdown. In aviation applications this very often means that the test situation must be simulated in the laboratory, because breakdown means a crash.

Broadly, the present situation is that design engineers either are unaware of the need for using quantitative information on human performance in their basic design, or, if they are aware of the need, they do not know where to find the data. No human engineering research is taking place in this country, and it is doubtful if there is a single biologist with sufficient knowledge in this field to act as a consultant.

If Australian aviation, military services and industry are to catch up with and then keep abreast of overseas advances in this field, four objectives must be realized. First, engineers must be persuaded to give up a recklessly intuitive attitude towards human operators in favour of a scientific approach—an acceptance of the fact that human performance can be reliably measured provided one takes the trouble to make use of the proven methods of experimental psychology. Secondly, the existing information must become readily accessible to them. Thirdly, psychologists and other biologists who have knowledge in this field must be available to act as consultants to designers. Fourthly, to ensure that psychologists and others become skilled in human engineering and to provide a means of settling new problems by experiment, universities or technical institutions must be provided with funds from the services or other government sources in order to set up human engineering laboratories.

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## SIGMOIDOSCOPY.


By E. S. R. HUGHES and JOHN B. TURNER,

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THERE are certain features concerning the use of the sigmoidoscope which require emphasis. The procedure is relatively simple, requiring cleanliness and not sterility, and seldom needs preliminary bowel preparation, sedation or anæsthesia. Sigmoidoscopy should be considered an essential part of the routine investigation of diseases of the anal canal, rectum and colon. It must be realized that digital examination of the anal canal and rectum, followed by a barium clysma, is quite inadequate in the management of these cases.

### The Sigmoidoscope.

All sigmoidoscopes possess a tubular portion, usually 25 to 30 centimetres in length, an eyepiece with or without a telescopic attachment, bellows, and a lighting system.

The authors prefer the Lloyd Davies sigmoidoscope

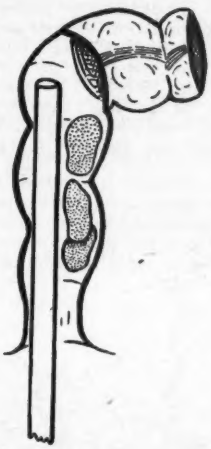

FIGURE I.

Solid fæces can be by-passed and do not require removal.

which has two tubular metal parts, a narrow one which is 1·5 centimetres in diameter and 25 centimetres in length, and a wider tube 2·0 centimetres in diameter and 30 centimetres in length. For routine examination the smaller tube is used. The same eye-piece will fit either tube. It carries the light globe which is situated proximally and has the beam directed distally down the tube by a metal cap. The necessary voltage is provided by a lead from a separate battery or transformer.

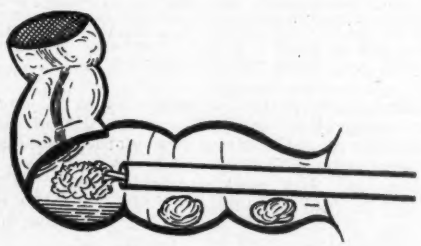

FIGURE II.

Liquid fæces are allowed to run out through the metal tube; any remaining pools are absorbed in cotton wool pledgets which can be removed later.

Although most of the modern sigmoidoscopes possess proximal lighting, some clinicians prefer the distal lighting supplied in such instruments as the Strauss. It is considered, however, that distal lighting provides no better illumination than the proximal and has the major disadvantage of fading out as the globe is blurred with fæces, mucus or blood.

### Preparation for Sigmoidoscopy.

Preliminary enemata or bowel washouts are unnecessary except in occasional cases. Solid fæces can be by-passed (Figure I) and soft fæces can be removed by swabbing. Liquid fæces are allowed to run out through the metal tube, and any remaining pools absorbed in cotton wool pledgets (Figure II), which can be removed later. Occasionally an alteration of posture is necessary in these cases. Bowel wash-outs are uncomfortable for the patient and time-consuming for the staff, and may remove a tell-tale scrap of bloody mucus from the surgeon's vision.

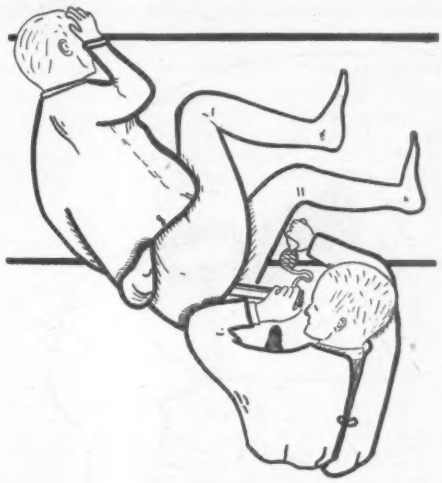

FIGURE III.

The patient lies on his left side with both thighs flexed, the right more than the left. The buttocks overlap the edge of the table. Note the surgeon's left elbow resting lightly on the right buttock of the patient; this gives complete control in the event of an unexpected movement of the patient.

Inspection of the anal margin is essential; if a dorsal fissure-in-ano is present, it should be regarded as a contra-indication to sigmoidoscopy unless performed under anæsthesia.

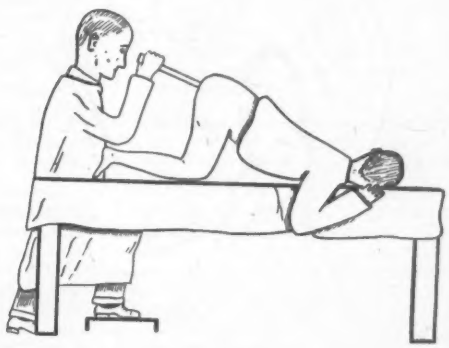

FIGURE IV.

The knees-chest position gives an excellent view of the rectum, but it is awkward and undignified for the patient. Note the surgeon in this case is not resting his arm on the patient's buttock; a sudden movement may be dangerous.

Digital examination of the anal canal and rectum must always be done. Not only does it prepare the patient for subsequent instrumentation but it also discloses the nature of the fæces which are to be encountered, and, moreover, tumours within 10 centimetres of the anus can be palpated.

Proctoscopy should precede sigmoidoscopy because it is difficult in some cases to visualize the lower third of the

rectum and anal canal comfortably through a sigmoidoscope.

### Position for Sigmoidoscopy.

The left lateral position, introduced by Marion Sims in 1845, is adopted as a routine. The patient lies on the left side with both thighs flexed, the right more than the left. The buttocks overlap the edge of the table (Figure III).

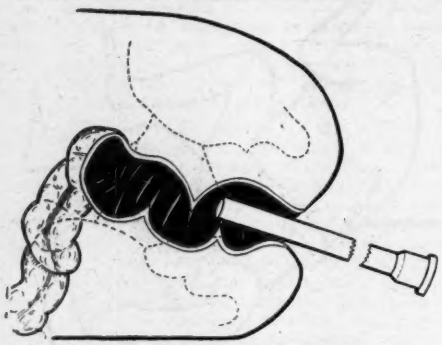

FIGURE V.

The rectum seen from behind, with the left lateral position. The sigmoidoscope is passing over the lower valve of Houston which can be seen in addition to the middle and upper valves.

This posture is far more satisfactory to the patient than the awkward and undignified knee-chest position (Figure IV). The authors employ this position only when the fæcal content is fluid and constantly runs backward and occludes the eye-piece.

FIGURE VI.

This demonstrates the changing direction of the sigmoidoscope as it passes the rectum; in the region of the recto-sigmoid junction it passes close to the left iliac vessels, the pulsations of which can always be seen transmitted through the bowel wall.

### Technique.

The sigmoidoscope is smeared with lubricant (a water-soluble lubricant is much better than "Vaseline") and is gently pushed a distance of four to five centimetres along the anal canal into the lower third of the rectum. The obturator is withdrawn and the eye-piece, with lighting apparatus and bellows, inserted.

The instrument is held in the left hand, with the examiner's left elbow resting slightly on the patient's right hip (Figure III). This gives complete control over the movements of the instrument during its passage and is a safeguard against damage from an unexpected movement from an apprehensive patient.

The first landmark may be the lowest valve of Houston. As the instrument is advanced it passes under the middle valve, which is constantly seen and is approximately 6·0 to 8·0 centimetres from the anal verge (Figure V). It corresponds with the reflection of peritoneum from the middle third of the rectum. Between four and seven centimetres higher is Houston's upper valve, which is on the left side of the rectum. During the passage of the instrument through the rectum it will be noticed that direction changes. In the lower third of the rectum the instrument points towards the hollow of the sacrum, but later the eyepiece moves dorsally to allow the tip to follow the curve of the sacrum, so that by the time it has reached the recto-sigmoid junction it points towards the umbilicus (Figure VI). It must be stressed that little air need be pumped into the rectum.

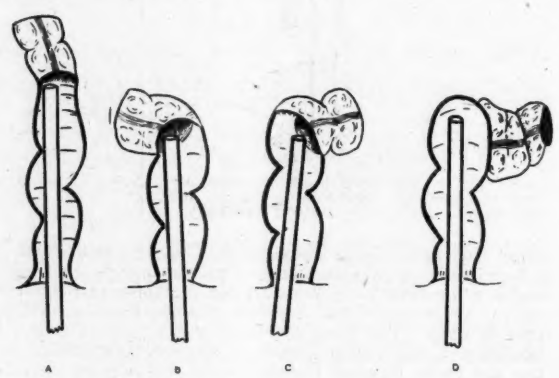


FIGURE VII.

A. In 25% of cases the sigmoidoscope slides straight into the sigmoid colon. B. In 25% of cases after some delay, the instrument reaches the sigmoid; the opening is found on the right side. C. In 25% of cases the opening is found with some difficulty on the left side of the recto-sigmoid zone. D. In the remaining 25% of cases it is quite impossible to negotiate the recto-sigmoid junction.

The initial part of the procedure up to 15 centimetres is quite straightforward. The most difficult stage of sigmoidoscopy is the manipulation of the instrument into the sigmoid colon. No force can be used at any time, and as is the case with most endoscopic examinations, the sigmoidoscope may be advanced only when the lumen is visualized. With regard to this stage of the operation, certain observations have been made.

In about 25% of cases the clinician has no difficulty at all. The sigmoid lumen appears to lie in direct continuation with the rectum and the instrument slides to its full length straight into the sigmoid colon (Figure VIII, A). Just after the instrument passes into the colon, pulsations transmitted from the left common iliac artery are visible (Figure VI). Even when the limit of the instrument has been reached it is sometimes possible to see some distance beyond into the sigmoid lumen.

In another 25%, on the other hand, the passage of the sigmoidoscope beyond the recto-sigmoid region is impossible (Figure VIII, D). Occasionally, alteration in the position of the patient or reexamination some days later will permit a complete sigmoidoscopy to be accomplished. The opening in these cases is in the anterior segment, but it is not found because the bowel is so sharply kinked. This may be of purely anatomical origin, but it is not uncommon in diverticulitis and in carcinoma of the lower sigmoid colon.

In the remaining 50% of examinations the clinician is able to negotiate the recto-sigmoid junction, but only after some difficulty. In about half of these the opening appears to be on the left side and in about half on the right side (Figure VII, B and C). The tip of the instrument is manipulated with due patience through the junction, and further passage for the full length of the sigmoidoscope becomes possible. It is important to record the distance from the anal verge that the instrument is passed; the fact that the instrument only reached 15 to 18 centimetres and that the recto-sigmoid junction could not be negotiated is not an admission of lack of skill, but a statement of fact which assists the radiologist who subsequently gives a barium clysma, and which may lead the surgeon to advise a laparotomy in a suspicious case (Figure VIII).

### Complications of Sigmoidoscopy.

*Pain.*—A certain amount of discomfort is inevitable in these investigations. There are, however, two common causes for pain which may be avoided or minimized by careful technique.

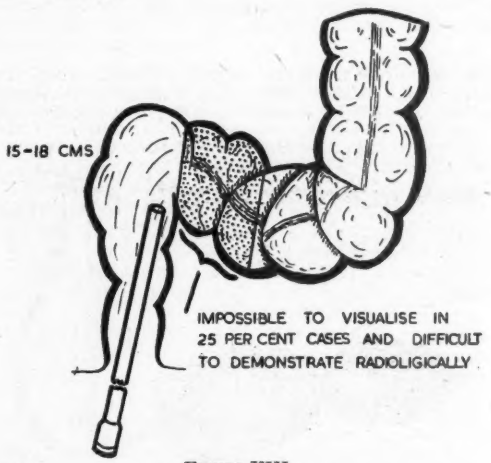


FIGURE VIII.

The surgeon should note the distance the instrument was passed; if it passes only 15 to 18 centimetres, it means that the recto-sigmoid junction could not be negotiated, and the radiologist's task is rendered the more difficult.

The first is over-distension of the bowel with air (Figure IX); in the rectum this produces an urgent desire to defæcate, and in the sigmoid a griping abdominal pain which might be severe (Goligher and Hughes, 1951). Excessive introduction of air is unnecessary.

Secondly, pain may arise from forcible stretching of the anus during the negotiation of the recto-sigmoid junction (Figure X). This may be relieved by placing the fingers of the left hand on the instrument at the anal verge, thereby transferring the fulcrum for the necessary leverage required from the anus to the fingers.

*Perforation of the Bowel.*—Fortunately this is a rare complication and usually occurs anteriorly above the peritoneal reflection. A gentle technique and especial care in cases of ulcerative colitis should avert the danger of this complication.

### Sigmoidoscopy in Routine Rectal Examinations.

The authors believe that all patients with anal canal or rectal complaints should be examined with the sigmoidoscope, whether the symptoms be bleeding, prolapse, discharge of blood or mucus, pain, alteration in bowel habits or pruritus.

Although it is not suggested that the incidence of carcinoma of the rectum or sigmoid colon is any greater in patients with hæmorrhoids or *fistulæ-in-ano*, all experienced clinicians are familiar with cases in which a tumour has been visualized unexpectedly.

Furthermore, the presence of any of these symptoms is too frequently complacently diagnosed by the patient as "piles" and occasionally accepted as such by the doctor, as is indicated in the Royal Melbourne Hospital records by a 4% delay in treatment of carcinoma of the rectum through misdiagnosis.

Sigmoidoscopies take but a few minutes to perform, are associated with minimal discomfort to the patient and yet bring into view the most common site for tumours of the large bowel.

### Sigmoidoscopy in Investigation of Rectal Bleeding.

Bleeding from the anus is most commonly due to a benign condition. Bleeding and prolapse suggest hæmorrhoids as the cause; bleeding with painful defæcation suggests a fissure, whilst bleeding with mucus and frequent bowel actions suggests proctitis or procto-colitis.

FIGURE IX.

Over-distension of the bowel is unnecessary and painful.

Inspection, digital examination and proctoscopy are often sufficient to permit a tentative diagnosis, but sigmoidoscopy is essential as the real cause may be a tumour.

*Carcinoma of the Rectum and Recto-Sigmoid.*—Early carcinomata are usually protuberant, but soon ulcerate and extend around the circumference of the bowel. They are hard and this hardness can often be appreciated by palpating the tumour with the end of the sigmoidoscope. A biopsy from the raised everted edge is an easy procedure, but the pathologist must be provided with an adequate piece for examination. The authors have experienced no trouble from any subsequent bleeding. Gabriel, Dukes and Bussey (1951) reported a 97% accuracy in biopsy reports in 670 cases of malignant tumours of the rectum and anus.

*Granular Proctitis.*—The sigmoidoscopic findings are diagnostic in this condition. The lumen of the bowel contains blood and mucus and occasionally pus. The vascular pattern of the submucosa is obscured by a mucosa which is thick, red, granular and moist; mucosal hæmorrhages are not uncommon. A few small ulcers may be visible, but deep ulceration is rare. On distension with air the bowel wall is found to be elastic. The lesion stops at the recto-sigmoid junction.

*Ulcerative Colitis.*—Again the sigmoidoscopic findings are distinctive. In the lumen is a profuse muco-purulent discharge containing blood, and the bowel wall is not

distensible on air pressure. Deep irregular ulcers are characteristic, whilst the intervening mucosa is red and friable. It is found that the lesion extends into the colon beyond the reach of the sigmoidoscope, which must be handled with extreme care. Pseudo-polypoidal tumours may be found in advanced cases.

*Multiple Polyposis of the Rectum and Colon.*—The early diagnosis of this condition can be made only by use of the sigmoidoscope. If clusters of polypoidal tumours are seen, it may be taken as certain that the lesions are present in other parts of the large bowel. The multiple tumours are seen in barium clysma examinations only when they are well developed.

FIGURE X.

Forcible stretching of the anus during the negotiation of the recto-sigmoid junction is a cause of pain.

*Carcinoma of the Sigmoid Colon.*—The lower end of the colon is notoriously difficult for the radiologist to examine, no matter how skilled he may be. Occasionally, therefore, the diagnosis of lesions just above the recto-sigmoid depends entirely upon the sigmoidoscopic findings. As the instrument passes up the bowel the clinician can often see flecks of blood and mucus on the surface of motions within the rectum.

### Sigmoidoscopy in Investigation of Alteration of Bowel Habit.

Any alteration of bowel habit, whether it be increasing constipation, true diarrhœa, spurious diarrhœa with the passage of blood and mucus, or unsatisfied defæcation (often associated with frequent attempts at defæcation), requires sigmoidoscopic examination.

Some patients have attacks of diarrhœa lasting some days, with periods of normal bowel habit between. These patients are best submitted to sigmoidoscopic examination during the attack of diarrhœa, because if the tumour forms the apex of an intussusception it is more likely to be visualized at this time.

In diverticulitis there is little that is characteristic on sigmoidoscopy. It is most uncommon to see the opening of a diverticulum. There may be an excessive amount of mucus in the lumen, and the mucous membrane, although pale, appears thickened and œdematous, and the bowel is often not easily air-distensible.

Villous tumours are sometimes responsible for persistent spurious diarrhœa. These tumours secrete large quantities of mucus requiring frequent evacuation; they are difficult to feel digitally but are diagnosed on proctoscopy and sigmoidoscopy.

### Summary.

1. The ease with which sigmoidoscopy can be performed is stressed.

2. A plea is made for the routine use of the procedure in the investigation of diseases of the anal canal, rectum and colon.

3. The advantages of an instrument with proximal lighting, the use of the left lateral position and the technique of sigmoidoscopy have been discussed.

4. The authors report a 25% failure in complete examination of the lower sigmoid colon.

5. The indications and sigmoidoscopic findings in certain conditions have been described.

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GABRIEL, W. B., DUKES, C. E., and BUSSEY, H. J. R. (1951), "Biopsy of the Rectum", *Brit. J. Surg.*, 38: 401.

GOLIGHER, J. C., and HUGHES, E. S. R. (1951), "Sensibility of Rectum and Colon. Its Role in the Mechanism of Anal Continence", *Lancet*, 1: 543.

## MODIFICATION OF STANDARD SIGMOIDOSCOPE.

By E. S. R. HUGHES,
*Melbourne.*

THE modification of the standard sigmoidoscope to be described has proved useful in hospital and consulting room practice, but particularly in domiciliary consultations.

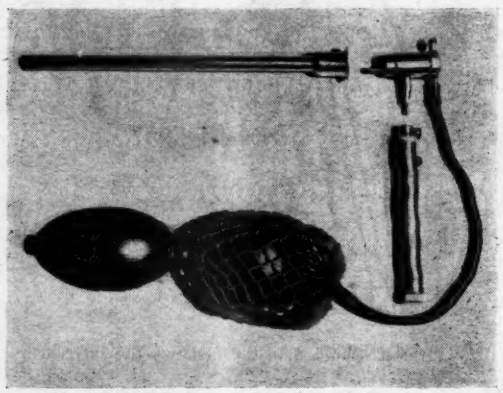

FIGURE I.

Some sigmoidoscopes are illuminated by a distal light, but most of the modern instruments possess a proximal light; power is supplied from the main or from a battery connected to the sigmoidoscope by a lead.

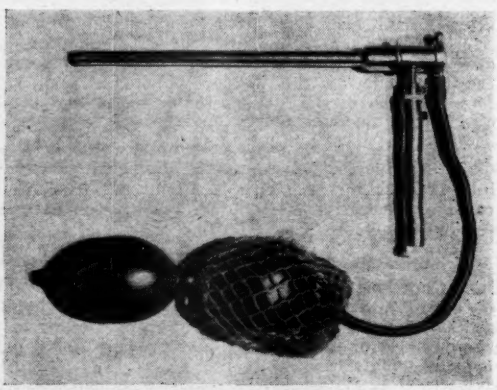

FIGURE II.

I prefer the Lloyd Davies type of sigmoidoscope with proximal lighting; with the assistance of Messrs. Felton, Grimwade and Duerdins Proprietary, Limited, I have

replaced the long lead with its cumbersome battery by a short handle containing two "Eveready" batteries, size AA, number 915, which fit into the socket. I understand from the manufacturers that this battery is a standard size readily obtainable in nearly every country in the world.

The handle is detachable so that the instrument can be cleaned, and the attachment is convertible to permit the use of either source of power. The readiness with which such an instrument can be packed will be appreciated.

## STABILITY OF URINARY DIASTASE.

By F. G. BELL and JOAN B. PATON.
*From the Institute of Medical and Veterinary Science, Adelaide, South Australia.*

THE pancreas has always been considered to be the chief site of production of urinary diastase, although under certain circumstances the salivary glands may contribute appreciable amounts.

In acute pancreatitis the serum level of diastase rises rapidly, but the surplus is soon excreted in the urine, so that abnormal values in serum are rarely obtained more than forty-eight hours after the onset of the disease. The urinary output tends to remain high for several days after the blood level has subsided and may be a valuable means of confirming a diagnosis of acute pancreatitis or distinguishing it from other acute abdominal conditions.

Estimation of diastase in serum or urine is of less value in chronic pancreatitis, as high values are not common and other possible causes, including mumps, obstruction of the pancreatic duct, renal failure and perforated gastric or duodenal ulcers, must be excluded.

Information about the stability of diastase in biological fluids is not given in the majority of text-books, and the amount present in normal serum or urine is insufficient to determine accurately any losses which may occur in such specimens on standing. It is therefore difficult to know how much reliance can be placed on the values of diastatic activity of specimens received at the laboratory some time after collection. The following observations are therefore of some interest in showing that when present in high concentration urinary diastase is reasonably stable.

In February specimens of urine were received from two subjects and both showed high diastatic activity (diastatic index 280 Wohlgemuth units) as measured by the method given by Harrison (1937). One was a twenty-four hour specimen which contained some toluol as preservative, the other was a single specimen without preservative. After the initial test each specimen was divided into two, one part being kept in the refrigerator and the other in a clear glass bottle at room temperature, which sometimes reached 85° or 90° F. No extra toluol was added to the specimen which originally contained the preservative. In the single specimen of urine there was no measurable alteration in diastatic activity in either specimen over a period of four days, but in this case serial dilutions were used for testing, so that when higher dilutions were read, small variations in concentration could not be detected. In the case of the twenty-four hour specimen intermediate dilutions were made so that a clearer picture could be obtained. The refrigerated specimen showed no alteration in activity during the first seven days; the activity then began to fall slowly, but was still more than two-thirds the original value at the eleventh day. The specimen kept at room temperature showed no alteration at twenty-four hours, but the value then fell slowly to approximately half the original level by the end of five days.

It is concluded from this that specimens of urine can be kept in the refrigerator for a period of four to five days without undue loss of diastatic activity, even in the absence of a preservative. Where refrigeration is impossible, results obtained within twenty-four hours are satisfactory, and even tests carried out some days after collection of the specimen will probably still indicate whether the diastatic activity has been raised.

### Reference.

HARRISON, G. A. (1937), "Chemical Methods in Clinical Medicine", Second Edition, Churchill, 277.

## THE ÆTIOLOGY AND MODERN TREATMENT OF ACNE VULGARIS.[1]

By JOHN C. BELISARIO, C.B.E., E.D., M.D., Ch.M., D.D.M., *Sydney.*

### Ætiology.

ACNE VULGARIS, primarily a disease of adolescence, may appear in the late twenties, in the early thirties or occasionally up to the age of forty years or over. Rare cases have been reported in infants (Belisario, 1939; Aitken, 1941).

There appear to be no particular familial influences (Belisario, 1951).

It seems that endocrine imbalance is the most important single factor involved (Macgregor, 1951; Belisario, 1951); but numerous other factors, both endogenous and exogenous, may be concerned, so that every possible aspect should be examined in each individual patient. Of these aspects, the chief external factors comprise postural habits, the use of cosmetics, the wearing of wool or furs, and occupational contacts, such as grease, oils, and waxes.

Drugs which may participate in the ætiology include iodides and bromides, whether taken medicinally or in the diet, as in iodized salt. There is quite a divergence of opinion as to the role played by diet, and the only food concerning which there appears to be much unanimity about its effect as an aggravating factor is chocolate.

*Pityriasis capitis* has been found in a sufficient number of cases by Lipman Cohen (1945) to suggest a relationship to acne; but my experience does not support this (1951). Lipman Cohen (1945), in a study of 500 women, found no support for the statement that acne and "seborrhœic" dermatitis were apt to occur together. Although the majority of acne patients have polyseborrhœa, it can occur in patients with oligoseborrhœa. Acne may thus be said to occur in association with dysseborrhœa, since a dysfunction of the sebaceous glands with alterations of their secretion seems to occur in all forms of *acne vulgaris*.

It has been suggested that hydration of the skin, which may be due to an endocrine factor, and premenstrual in occurrence, could be ætiologically important (Stokes *et alii*, 1938; Stokes and Sternberg, 1939). This may easily be the case, if only for the reason that fluid retention in the skin can favour bacterial infection (Barber, 1938).

Gastro-intestinal disturbances do not appear to play an important role, but should receive attention when present on general principles.

Fatigue and exhaustion can play a part in some instances, and occasionally anæmia may be concerned (Belisario, 1951; Hansman, 1951).

Toxic foci are rarely found to be a contributory factor, but the part played by bacteria locally appears to be of greater significance. Much evidence points to the presence of cocci as being superimposed rather than a causative factor in acne (Barber, 1948; Ormsby and Montgomery, 1948; Sulzberger and Baer, 1949; Roxburgh, 1950). Some of the earlier writers also considered that they played an important causative role (Sabouraud, 1897; Unna, 1908). More recently some evidence has accumulated suggesting that bacteria may be implicated to a greater extent than is believed at present. *Acne vulgaris* is based on changes in the sebaceous glands and their ducts of such a nature that infection is facilitated (Goldzieher, 1947), and comparative studies of the palms and of the conchæ of the ears

[1] Read at the International Congress of Dermatology, 1952.

suggest that the sebaceous glands are the major site for the growth of organisms on the skin (Evans, 1950). Lovell (1945) has shown that the chief nidus for bacteria is the mouth of the follicle. Tropical acne is in a sense the counterpart of prickly heat, in which occlusion of the ducts of the hyperactive sweat glands seems to be the essential ætiological process (Sulzberger *et alii*, 1946; Novy, 1946), and O'Brien (1951) has found that sweat glands are prone to changes which parallel acne. A contributory role by cocci in acne seems likely, since O'Brien (1950) earlier suggested that a staphylococcal infection of the pores appears to be the predominant cause of acute tropical *miliaria rubra*, and that there are œdema of the *stratum corneum* and increased local temperature when cocci are present.

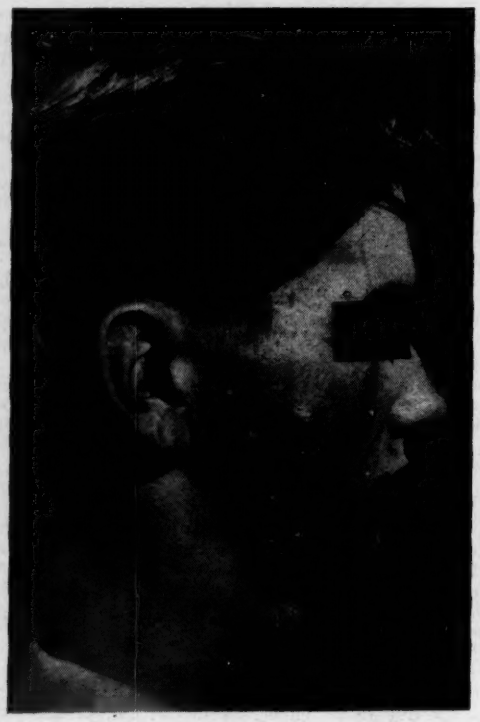

FIGURE I.

Cystic acne lesions of the face before treatment with bismuth oxychloride and X-radiation. The upper lesion had not been previously treated; the lower lesion had been incised before I treated the patient, and continued to drain without healing.

Histologically, keratosis at the follicular mouth, obstruction of the follicle and suppuration are the main changes seen, and of these obstruction is predominant from the outset (O'Brien, 1951). O'Brien also suggests that the ring-like encirclement of keratin at the follicular mouths and its reactions are probably of much significance for the follicle as a whole. He suspects that a low-grade bacterial infection in the lumen of the ring stimulates an associated keratosis, and that the ensuing obstruction of the follicular keratin ring is the primary lesion in acne, and considers that general factors should be considered on this basis. He points out further (1952) that so-called general causes may not act by initiating the essential local obstruction, but by stimulating sebaceous secretion they make manifest an obstruction by local factors. In acne, as in *miliaria rubra*, primary and secondary infection cannot be sharply distinguished.

In addition, MacDonald and Taylor (1951), in a controlled experiment on 66 cases of "pustular acne" in Royal Air Force personnel aged betwen sixteen and nineteen years, obtained improvement in 60% of patients treated with staphylococcal toxoid as against 16% in the controls. Prior to treatment, staphylococci (mostly coagulase-negative) were grown on culture from the pustules in all but two cases.

Also, Hopkins *et alii* (1951) found that the intradermal injection of staphylococci in sensitized rabbits produced downgrowth of hair follicles and an activation of hair growth, followed by the formation of cysts resembling sebaceous cysts and follicular plugs resembling comedones. They considered that an allergy to causative staphylococci might explain the sterility of pus-filled cysts in acne, as there was little doubt that staphylococci played an essential role in producing the acne pustule. Peck in a following discussion considered that reactions to ingrown hair were

FIGURE II.

Result of treatment with bismuth oxychloride and X-radiation. Note resultant cosmetic effects—linear scar in evidence in previously incised lesion.

responsible for cyst-like lesions on the neck, and that sensitization to staphylococci could account for the good results he had achieved with an autovaccine in certain cases of acne.

Noojin and Sewell (1951) found that their cure rates increased progressively when "Intraderm" sulphur and "Intraderm" tyrothricin were used together.

Weidman (1952) has drawn attention to the fact that lecithin can be acted upon by bacteria to produce choline, which is of the order of histamine. This could account for a flare-up, when an acne pustule is squeezed, not commensurate with the amount of trauma. Also the presence of fatty material containing lecithin in conjunction with bacteria in acne lesions may explain the flare in lesions which do not appear to be bacterial.

Excessive sweating may assume a degree of importance, as was stated by Bateman in 1826, who noted exacerbation of acne when exercise in hot weather was followed by the taking of copious draughts of cold water. More recently Cleveland (1938) and Roxburgh (1950) have also drawn

attention to this fact. Aggravation due to excessive sweating was particularly noticeable in the tropics during the last war (Allington, 1945; Novy, 1946; Sulzberger *et alii*, 1946). In New Guinea (Belisario, 1951) acne appeared in personnel well past the usual "acne age", and the condition of practically every subject with acne became worse on his arrival. The lesions, often of the severe cystic type, were commonly widespread, even affecting the lower parts of the legs, the feet, the groins and the axillæ, and in several cases suggestive lesions were present on the palms where sebaceous glands are absent, thus lending support to the analogy of acne with prickly heat. Probably the most important factors were excessive heat and humidity, which predisposed the subject to the eruption of the lesions by over-stimulation of the sebaceous glands.

In this respect Flesch and Hunt (1952) have advanced the theory that human sebum plays an important role in disturbances of keratinization. Another factor appeared to be significant—namely, that only chlorinated water was available for Australian personnel; and halogen drugs are credited with causing irritation of the pilo-sebaceous follicles during excretion. Goldschlag (1951) obtained satisfactory results by treating some of these patients with a salt-free diet, and Murray-Will (1951) has seen in a number of cases quiescent acne flare up after regular bathing in chlorinated swimming pools.

White (1951) traced the cause of acneiform lesions in seven patients to a high intake of chlorides with high blood levels of chlorides. He found that restriction of the chloride intake cured the lesions and relapse followed their readministration. He believes that, in addition to medicines and certain salt substitutes, some preserved foods are likely unsuspected sources.

FIGURE III.
Acne cyst in centre of back before treatment with bismuth oxychloride and *X*-radiation.

With regard to vitamins, Corcoran and Rabinowitch (1937) found no evidence of acne in 1500 Eskimos whose daily diet contained no less than 50,000 international units of vitamin *A*. This may be construed as suggestive evidence for the efficacy of vitamin *A* therapy. Hansman (1951) suggests that this absence of acne could be due to a lack of cereals and carbohydrates, and Blackburn (1951) that the constant chilling of the exposed skin may have kept the face free. Vitamin *A* tends to influence favourably abnormal cornification at the follicle orifices, and Sulzberger and Baer (1949) have seen clear-cut clinical improvement with large doses, preferably in an aqueous dispersion. The results obtained by various authorities with other vitamins—for example, *B* and *D*—seem to be equivocal.

Psychosomatic influences appear to be secondary rather than primary in their effects. If the comedo is the essential lesion of acne, then almost everyone has it in some degree at the age of puberty (Engman, 1941; Hansman, 1951). It has been stated that sexual and emotional tension may affect the endocrine system, the gastro-intestinal tract and the vasomotor mechanism in the direction of influencing the production of acne (Cleveland, 1938; Stokes and Sternberg, 1939; Andrews *et alii*, 1951). Others believe that psychic and sexual factors are mainly subsequential or do not appear to play any role in the ætiology of acne (Whitfield, 1934; Lipman Cohen, 1945; Sulzberger and Baer, 1949; Cormia, 1950).

Acne and psychological disorders are peculiarly likely to develop at the age of adolescence and in relation to change in androgen production. It appears that a previous liability to psychological disorders is present in those in whom acne causes them to appear.

Endocrine influences are mainly bound up with the sex hormones and seem to be more conditioned by an imbalance of the androgen-œstrogen ratio than by a simple increase or decrease in the secretion of either hormone. Quiroga *et alii* (1950) found an average daily excretion of 18 milligrammes of 17-ketosteroids in affected males and 25 milligrammes in affected females, as compared with a normal average of 8·0 milligrammes. Endocrines may act through the fat-secretory mechanism, water balance, carbohydrate metabolism and psychosomatic influences—for example, sexual emotion. Acne appears commonly during the period of maximum activity of the reproductive organs, and may be worse in females around the time of menstruation, when the œstrogen level is low. It is found only in subjects with functioning gonads unless androgens are administered or produced by disease (Blackburn, 1951), and it appears that testicular androgens play the most important role in males, since the adrenals are intact in eunuchs, who develop acne only when given androgens. It is problematical whether adrenal or ovarian androgens are more important in the female. The follicular apparatus of the skin may exhibit variations in sensitivity in different persons (Bloch, 1941), so that cortical and testicular androgens and somatotrophin (the anterior pituitary growth hormone), which stimulate sebaceous secretion, may stimulate hyperkeratosis of the pilosebaceous ostia (Wile *et alii*, 1939; Dunlop, 1951), resulting in the production of comedones, while œstrogens have the opposite effect (Barber, 1948; Dunlop, 1951).

On occasion the administration of androgens will improve the condition of some patients with acne (Riley, 1938; Belisario, 1951), and other cases have been reported in which œstrogens have induced or exacerbated lesions (Sulzberger and Baer, 1949).

A disturbed balance in the androgen-œstrogen ratio, through changes in the pH, can so alter the physiology of the skin as to render it more vulnerable to normal flora (Macgregor, 1951) and superimposed organisms. Further

evidence of disturbance in the androgen-œstrogen ratio can be seen in the profuse acne observed by Brunner *et alii* (1951) to follow injections of ACTH, which stimulates an over-production of androgen, and disturbs the relationship between œstrogen, progesterone and androgen due to the normal influence on the sex glands of the anterior pituitary gonadotropic hormone.

Opinions vary regarding the influence of thyroid secretion on acne (Lipman Cohen, 1941). An abnormally low thyroid secretion usually leads to disturbed keratinization and increased horn formation in the follicle mouths (Sulzberger and Baer, 1949). Sutton, junior (1949), and Burgess (1950) consider that most patients exhibit or have mild hypothyroidism, and use thyroid almost as a routine measure in treatment. I have found that patients with a low basal metabolic rate usually benefit from thyroid administration. Smith *et alii* (1951) found a basal metabolic rate of less than –10% in 42·5% of 353 patients.

Hansman (1951) considers that the comedone is due to inability of sebaceous secretion to flow to the skin surface because of increased viscosity caused by metabolites. He suggests that an attempt should be made to influence the biochemistry of the sebaceous glands so that the detritus and lipoids formed are of a lower melting point.

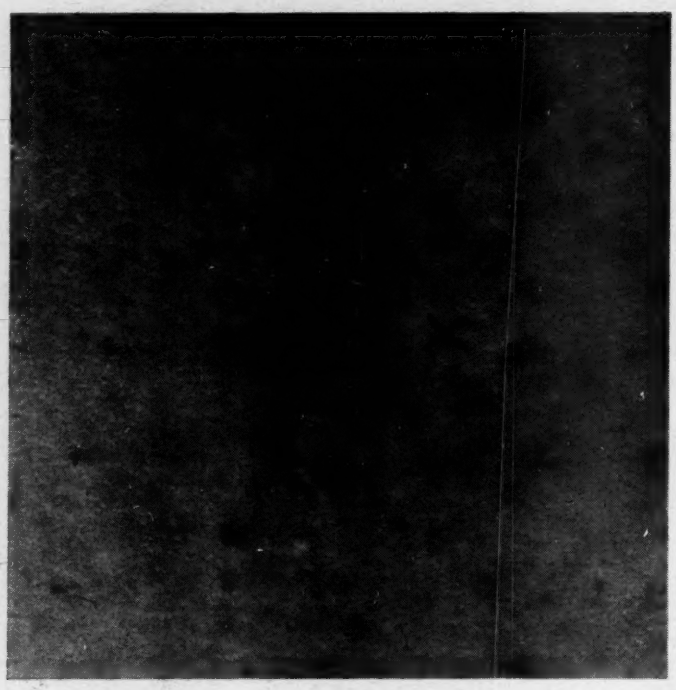

FIGURE IV.
Cross indicates area of cyst shown in Figure III, after treatment with bismuth oxychloride and X-radiation.

### Treatment.

I now rarely employ local treatment in the form of lotions, as the applied drugs gain freer entrance to the pilosebaceous follicles in a base containing at least 50% of animal fat (Ormsby and Montgomery, 1948). Support for this statement is seen in the observation of O'Brien (1947) that when a lipoid (lanolin) is applied to the skin in tropical anhidrosis, in which the sweat pores are blocked by plugs of keratin, the obstruction is almost at once relieved. This fact was probably significant in the method of treatment of Kurtin and Yontef (1949), which consisted of the application of an ointment containing 5% each of precipitate of sulphur, sulphathiazole and crude coal tar in equal parts of lanolin and Lassar's paste at night, and exposure of the affected areas to sunlight or ultra-violet rays in the morning. I have used this treatment with some success, and substituted sulphadiazine for sulphathiazole to diminish the likelihood of sensitization from sunlight. Shapiro (1949 and 1951) obtained satisfactory clinical improvement by the application of a cream containing 2·5 milligrammes of sodium œstrone sulphate per gramme. All patients had not responded to the usual methods of treatment, and no harmful effects were noted.

Up to the beginning of last year (1951) I had for some time used various routines consisting of local applications in lotion form and vitamins given orally (vitamin *A* 150,000 international units daily, vitamin $B_6$ 25 milligrammes thrice daily, nicotinic acid 50 to 100 milligrammes thrice daily, vitamin *E* 50 to 100 milligrammes daily), and various combinations of the above with other forms of therapy. Better results were obtained when vitamins and lotions were employed together than when either form of treatment was used alone. A combination of my modification of Kurtin and Yontef's ointment and œstrogens given orally also produced better results than either alone. Progesterone was also employed parenterally and "Proluton C" (Schering) by mouth with some satisfactory results. X-ray therapy was employed only if reasonable improvement had not been obtained within several months. The relapse rate was somewhat greater with treatment other than X-ray therapy, and the over-all results were better when it was employed. X rays were also more effective with a combined over-all routine of treatment than when used alone or with local applications of lotions as in the past.

Over the last eighteen months I have resorted mainly to local applications employed night and morning in a base of at least 50% anhydrous lanolin and incorporating the following in various combinations or alone: stilbœstrol 0·5%, "Proluton C" 1% to 2%, precipitate of sulphur 5%, with the addition of crude coal tar 3% and/or sulphadiazine 3%. Surprisingly better results were obtained with an over-all combination of stilbœstrol or "Proluton C", sulphur, tar and sulphadiazine applied night and morning after washing with ordinary soap and water. The fact that the addition of sulphadiazine improves the results is further suggestive evidence in support of the significance of pyococcal organisms, even without clinical evidence of their presence. Also the addition of crude coal tar appears to diminish the sensitization effects one might expect from sulphadiazine when exposure to sunlight occurs. On the odd occasion when irritation supervenes, it settles down rapidly after cessation of the treatment and does not seen to reappear when treatment is resumed. It is the exception rather than the rule for comedones, unless very numerous, to require manual removal during this treatment.

I have gained the clinical impression that the œstrogen in this ointment produces better results in females when there is an exacerbation of the acne around menstruation time, and "Proluton C" when this is not the case. This applies also to the use of stilbœstrol and "Proluton C" by mouth or progesterone by the parenteral route. I have also recently gained the impression that in the treatment of females stilbœstrol (which I employ in a dosage of 0·5 milligramme twice daily for ten to fourteen days) gives better results when given before than after menstruation. It would seem reasonable to expect this, since the blood œstrogen level is lowered at menstruation time and the excretion of œstrogen and pregnanediol is also lowered. In this respect there is less chance of upsetting menstrual periodicity by causing failure of ovulation through inhibi-

tion of the anterior pituitary gland activity (Macgregor, 1951). Another routine I have employed is to give stilbœstrol in the above-mentioned dosage for fourteen days after menstruation and follow this by 10 milligrammes of "Proluton C" daily for five days.

Progesterone when used alone is given intramuscularly in doses of five milligrammes weekly up to 12 or more doses, or ten milligrammes of "Proluton C" by mouth four times weekly. If interference with menstruation or nausea occasionally occurs in females or soreness or enlargement of the breasts in males receiving stilbœstrol (which is seldom given for more than three months), these symptoms soon resolve on cessation of treatment. Symptoms are rare in females receiving progesterone and I have encountered none in males. Occasionally symptoms appear when stilbœstrol is used in ointment form. The administration of œstrogen percutaneously not only promotes a more normal androgen-œstrogen ratio, but has the added effect of inducing vascularity of the treated area, thus helping to control infection (Macgregor, 1951); it also exerts a greater effect on abnormal skin keratinization and follicular plugging, and owing to the greater local concentration goes further in the restoration of the physiological function of the epidermal cells (Goldzieher, 1947; Sharlit, 1951) than when it is administered internally. When obvious pustulation is present or the condition tends to prove resistant, particularly when it is of the cystic type, the oral administration of sulphapyridine or sulphadiazine, 0·5 gramme to 1·0 gramme thrice daily for a week to ten days, with an intermission of a week after which the treatment can be repeated, is sometimes helpful. Likewise, aureomycin or terramycin can, and not infrequently does, prove of assistance. This again lends support to the organismal element in acne.

Patients with a low basal metabolic rate are given the requisite dose of thyroid, also iron, liver and folic acid if there is any anæmia as determined by a blood count. With regard to diet, I interdict only chocolate as a routine measure; but in resistant cases other foods likely to be causative (milk, pork, tomatoes, oranges, nuts and wheat flour) are also forbidden for about three weeks. If there is improvement, one of these foods is added to the diet for three days at a time to see if exacerbation will occur.

X-ray therapy still remains a most reliable method of attack. Although I employ it considerably less than formerly and even foresee the day when it may no longer be used for acne, up to the present X rays still help to produce the highest percentage of recoveries obtainable and to reduce the recurrence rate more than any other form of treatment.

I employ X rays, as I have for many years (Belisario, 1935), in a dosage of 100*r* (110 kilovolts, six milliamperes, half-value layer one to two millimetres of aluminium) weekly for eight doses, and give a further four doses if necessary after some months. A total dosage of 1200*r* is not exceeded, and I have seen no sequelæ from this routine. During X-ray therapy *Lotio Alba* (2%) is applied to the lesions night and morning.

Psychosomatic symptoms, if present, should receive attention.

For unsightly scarring I prefer the application of carbon dioxide and acetone slush, alone or in combination with 10% of precipitate of sulphur, and/or painting with trichloracetic acid. In some cases the application of a cautery knob is useful. Small resistant cystic lesions respond well to the application of trichloracetic acid or phenol, and carbon dioxide snow in a solid stick or acetone slush will produce good cosmetic results. For the larger cysts I have employed the following treatment in the past: (i) Excision. (ii) Incision, expression of the contents and swabbing with carbolic acid. (iii) Incision and expression followed by the injection of penicillin in various strengths in solution and in an ointment base, bacitracin in solution (500 to 2000 units per cubic centimetre) and sodium sulphathiazole (5% aqueous solution—Reiches, 1951). (iv) Incision and expression followed by destruction of the lining capsule with a diathermy knob. (v) Local X radiation, 400*r* to 600*r* (half-value layer one to three millimetres of aluminium).

I have recently attempted to use secondary photo-electron radiation in the treatment of the larger acne cysts. Cohen and Kimmel (1950) have employed this idea successfully in the treatment of secondary epithelial cysts. Bismuth oxychloride (10%) is incorporated in a base of "Vaseline" and liquid paraffin about the consistency of a cream and 1000 units of penicillin per gramme of base are added to control coccal infection. This ointment is placed in a malleable metal tube container, which has a nozzle about an inch long. A small incision is made in the cyst with a tenotomy knife and the contents are expressed. The nozzle of the metal tube is inserted into the cyst cavity after expression of the contents, and the cream is squeezed into the cavity while the sides of the cyst are held against the nozzle with the fingers until it is filled. An assistant is ready with a strip of "Elastoplast" to place over the incision immediately the nozzle is withdrawn, so most of the cream is retained. A dose of 400*r* of X rays (half-value layer two to three millimetres of aluminium) is then delivered to the cyst, the cream is expressed and a dry dressing is applied. Temporary refilling of the cyst may occur in the next few days, but it becomes considerably flattened within two to four weeks. The small remaining nodulation due to the collapsed cyst wall may take a matter of months to resolve completely. In the case of some large cysts or communicating ones, loculi should be broken down with a curette before injection of the cream. Occasionally a faint scar is left if the cyst is large. Up to date I have treated 85 cysts in this manner and have had to repeat the treatment for ten cysts. Two cysts did not disappear after a second treatment; one of these was then excised and the other treated with diathermy. The results appear to be as good whether the bismuth cream is well retained or not. The cosmetic effect is better than that obtained with any of the previous treatments, and in addition I was never able to obtain this high cure rate before except by excision with its resultant scarring. It would appear that secondary radiation from the bismuth particles may exert an extra destructive effect on the cyst lining, or the combination of the antibiotic and X rays may produce better results than the use of either singly. I have so far treated 12 cysts with penicillin only in the cream, followed by X radiation, and seven have recurred. Further trials are needed, but the indication is at present that secondary or characteristic radiation from the bismuth particles is the main determining factor.

*Summary.*

The general method of therapeutic attack may be summarized as follows:

1. Local application is carried out night and morning of an ointment containing the following: stilbœstrol 0·5 part, precipitated sulphur 5·0 parts, crude coal tar 3·0 parts, sulphadiazine 3·0 parts, anhydrous lanolin 50·0 parts, Lassar's paste to 100·0 parts.

2. Chocolate is omitted from the diet.

3. If there is no improvement in a month, vitamins *A* and *E* are given orally (synergistic action).

4. If there is no improvement in a month, "Proluton C" is substituted for stilbœstrol.

5. If there is still no improvement, progesterone is given parenterally or by mouth, or stilbœstrol and/or "Proluton C" by mouth combined with the use of appropriate ointment.

6. Further steps which may be indicated include attention to diet, a blood count and basal metabolic rate estimation, to be followed by any appropriate measures.

7. At this stage X radiation is employed unless there were previous indications of likely scarring, in which case it is used earlier.

8. General supportive treatment includes the administration of sulphonamides or antibiotics according to indications, the expression of resistant comedones and attention to any obvious abnormalities, such as psychosomatic or gastro-intestinal disturbances.

9. The foregoing scheme is varied according to indications, and other measures are used, such as the administration of testosterone, which benefits an occasional patient, or the treatment of individual cysts or scars.

### Conclusion.

In conclusion I would stress the fact that *acne vulgaris* is a complex disease in which no set routine can be used in all cases, each one requiring individual consideration.

### Acknowledgement.

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## Reports of Cases.

### REPORT OF TWO CASES OF LEPROSY.

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IT is intended to report two cases of leprosy of the nodular or lepromatous form, and to draw attention to the fact that leprosy must be considered in the differential diagnosis of atypical skin and nerve conditions in migrants, particularly those from the Mediterranean basin. These two patients were Maltese and had been resident in Victoria for two and three years respectively.

CASE I.—C.B., aged twenty-four years, presented with indurated acne of eight months' duration. Examination revealed skin-coloured nodules varying in size from two centimetres in diameter to lesions just perceptible to sight or touch. They were widespread; but the face, back, buttocks and flexor aspect of the limbs showed the most

pronounced involvement. The nodules were tender to firm pressure. There were palpable rubbery glands in the axillæ, groins and cervical areas. There were no obvious pigmentary changes in the skin. No pyrexia was detected on a number of occasions. The Wassermann test produced a negative result, and no organisms were grown on attempted blood culture. The serum cholesterol content was 260 milligrammes *per centum*. The hæmoglobin value was 14·3 grammes *per centum* and the leucocytes numbered 5500 per cubic millimetre, the cells being of normal distribution. Ordinary agglutination tests with *Brucella abortus* produced negative results. Blocking antibody tests gave positive results to a dilution of patient's serum of 1 in 160. A biopsy of a nodule from the thigh showed that the nodule contained many large foci of closely packed eosinophilic foamy cells. Scattered through the tissue and also in the epidermis were numerous acid-fast bacilli morphologically resembling *Mycobacterium lepræ*.

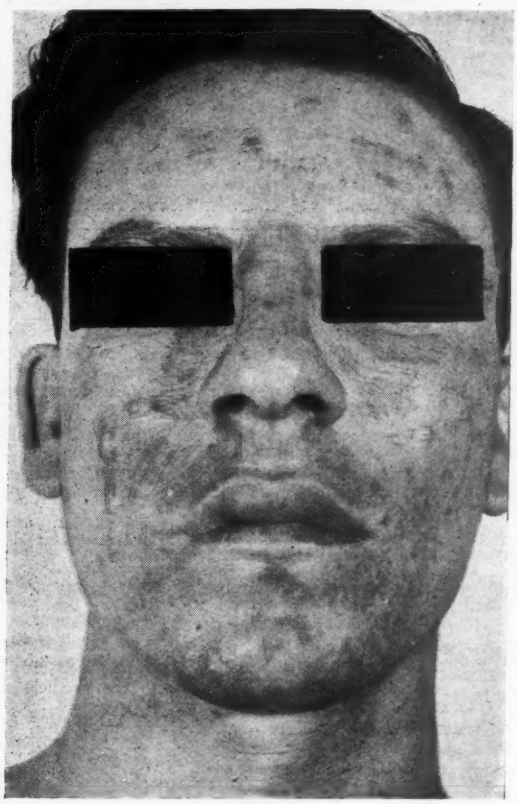

FIGURE I.

CASE II.—M.C., aged thirty-seven years, presented with relapsing nodular panniculitis (Weber-Christian syndrome; Birrell, 1952). Generalized skin nodules were present and the following areas were particularly affected: the forehead, the flexor and lateral aspect of the arms and forearms, the abdomen in the region of the umbilicus, the lumbar region and buttocks and the inner aspect of the thighs. An increase in pigmentation was noted in the skin over many of the nodules. There were enlarged rubbery glands in the axillæ and groins. There was a history of evanescent nodules of the thighs and elbows, and the patient was febrile on occasions. Biopsy of a skin nodule showed that the epidermis of the nodule appeared normal. The fat cells in the deeper layer of the dermis were largely replaced by cells with abundant foamy cytoplasm and small central nuclei. There were a few scattered foreign-body giant cells, and there was diffuse infiltration by a mixture of inflammatory cells, polymorphonuclear cells and small round cells, which were present in about equal numbers. There was a similar though less pronounced inflammatory infiltration of the fibrous septa between the fatty lobules. Endarteritis was present in the small arteries and arterioles of the dermis. Examination by fluorescence microscopy of a rhodamine auramine stained section revealed an abundance of acid and alcohol fast bacilli. Examination of a lymph node biopsy specimen showed "active" but otherwise normal follicles. Between the follicles the medullary tissue was packed with foamy cells similar to those in the dermis. Smears were taken from the facial nodules of both subjects after the skin had been punctured with a small-bladed scalpel and tissue scraped from the sides of the incised wounds. These contained an abundance of acid and alcohol fast bacilli in bundles and singly.

## Commentary.

According to Cochrane (1947) there are two cardinal signs of leprosy, and it is a good rule for all but specialists to refuse to diagnose leprosy in the absence of one or both these signs—namely, the presence of *M. lepræ* discovered by standard methods of examination and the presence of anæsthesia.

A simplified classification of the types of leprosy recognizes a neural form, which is in general benign and has a pronounced tendency to spontaneous healing, and a lepromatous (nodular) form, which is serious and marked by a relative lack of tissue resistance.

The neural form may show itself in three different ways: (i) as hypopigmented (not depigmented) macular areas with a well-defined edge, found particularly on the face, the lateral aspect of the extremities, the buttocks and the scapulæ, usually with some anæsthesia to touch or heat or pain; (ii) as infiltrated lesions, usually hypopigmented and of similar distribution and with a more pronounced tendency to anæsthesia (there is usually an enlargement of the associated cutaneous nerves); (iii) as anæsthetic areas, muscular paresis, paralysis and atrophy associated with trophic changes and characterized by enlargement of nerves, particularly the ulnar and peroneal nerves.

In the neural form, bacteriologically the skin lesions are typically but not invariably found to be free of leprosy organisms by standard methods of examination, though the organisms may be found in the nasal mucosa.

The lepromatous form shows itself as widespread infiltrated plaques and nodules and diffusely infiltrated areas with poor demarcation from the normal skin. Bacteriological examination of the skin usually reveals abundant bacilli.

In Australia, neural leprosy with skin lesions may mimic tinea, developing leucoderma, syphilis or a cutaneous sarcoid, or may present as peripheral neuritis. Lepromatous leprosy may be temporarily confused with acne, *adenoma sebaceum*, syphilis, *erythema nodosum*, leuchæmia, *lichen planus* or nodular panniculitis.

In the lepromatous type the presence of the *M. lepræ* will make the diagnosis simple, if leprosy is considered; but in the neural type the diagnosis can be very difficult even when leprosy is considered.

## Summary.

Two cases of lepromatous (nodular) leprosy are described in migrants.

Some of the commoner presenting signs and the differential diagnosis are briefly considered.

It is as well to remember that among 145 attempts to infect man with leprous material there is no single record of a deliberate experimental human transmission which can be accepted as proved without reservation.

## Reference.

COCHRANE, R. G. (1947), "A Practical Textbook of Leprosy".

# Reviews.

**A Treatise on Hygiene and Public Health: With Special Reference to the Tropics.** By Birendra Nath Ghosh, F.R.F.P. and S. (Glasgow), F.R.S. (Edinburgh); Thirteenth Edition; 1953. Calcutta: Scientific Publishing Company. 9" × 5½", pp. 802, with 151 illustrations. Price: 25s. 6d.

SINCE the first edition of this book was published in 1912, B. N. Ghosh has had a wide experience of public health and tropical hygiene as a worker, lecturer and examiner. It is claimed that the present thirteenth edition published in 1953 has been rewritten and brought up to date, although the size of the volume has not greatly increased. The author has been fortunate in securing among his contributors such world authorities on tropical medicine as Sir John Megaw (typhus *et cetera*), Dr. R. G. Cochrane (leprosy) and Sir Gordon Covell (malaria).

In places the book suffers from lack of clarity and might even be misleading owing to over-simplification of complex biological and immunity reactions. For instance we cannot agree with the statement (on page 591) that as the incubation period of vaccinia is shorter than that of variola, vaccination at any time during the incubation period will protect a person exposed to variola; nor with the remark (on page 593) that if a person is revaccinated soon after a successful "take" there follows an immediate reaction of anaphylaxis.

The author points out that public health is a purchasable commodity, and much of the value of his treatise lies in his efforts to fit modern conceptions of community health to the essentially rural, undeveloped, over-populated and industrially retarded countries of south-east Asia. Although he is no tropical Osler, his simple direct approach to the health problems often peculiar to these countries makes his text-book a valuable one for health workers and hygienists who have to contend with these issues.

A comparison of the following vital statistics for British India and Australia for the year 1937 will show the scope for the more comprehensive public health measures which are discussed in the text.

| Place. | Year. | Death Rate. | Infant Mortality. | Expectation of Life at Birth. | |
|---|---|---|---|---|---|
| | | | | Male. | Female. |
| Australia .. | 1937 | 9·4 | 38 | 63·5 | 67·1 |
| India .. .. | 1937 | 22·4 | 162 | 26·9 | 26·6 (years 1921 to 1930) |

**Modern Treatment: A Guide for General Practice.** By fifty-three authors, edited by Austin Smith, M.D., and Paul L. Wermer, M.D.; 1953. New York: Paul B. Hoeber, Incorporated. 10½" × 7½", pp. 1162, with 13 text figures. Price: $20.00.

THE fact that this book has been edited by Dr. Austin Smith, editor of *The Journal of the American Medical Association*, and by Dr. Paul L. Wermer, Secretary of the Committee on Research of that same body, shows that it is a volume to which serious attention must be paid. The editors state that the book is designed to provide the general practitioner with a useful and authoritative guide to the clinical problems in therapy which he is likely to encounter. They state that its 53 authors have tried to take account of all factors underlying the rationale of therapy and to provide sufficient information to enable the practitioner to adapt the best treatment to the needs of his patient. The book is divided into 51 chapters. Some of these cover diseases of systems, and others cover individual diseases. Each chapter is self-contained, though occasionally cross references are made from one chapter to another. The chapters are a summary of the authors' views, and in no instance are references given to work of others. The book is thus a work of reference, in which the practitioner will be able to gain a general idea of the subject with which he is dealing. For example, pulmonary tuberculosis is considered in a chapter on respiratory diseases. Its treatment is discussed in some nine pages. Diagnostic criteria are described, and the management of active pulmonary tuberculosis is discussed under the headings of rest therapy, collapse therapy, the choice of collapse therapy, and anti-bacterial therapy. These are set out in proper perspective, but the clinician will have to consult a special volume on tuberculosis for a detailed description of methods. The editors point out that conditions such as alcoholism and drug addiction have been omitted deliberately because they believe that much more experience is needed to permit satisfactory evaluation of therapeutic and social measures now under investigation in regard to them. In order that the practitioner may be able to apply certain special therapeutic aids, chapters have been devoted to such topics as the principles of pharmacology, immunity, radiology, diagnostic laboratory procedures, surgery, inhalation therapy and physical medicine. Some twenty odd pages have been devoted to "treatment in obstetrics". Here a praiseworthy attempt is made to cover the whole range of obstetrical treatment. The advisability of the inclusion of this chapter is, we think, open to question. On the other hand, such chapters as "pharmacological principles in treatment", "water and electrolyte balance", "allergy", and "surgical principles in treatment", are among those which seem highly desirable.

This book, which is well printed and provided with a useful index, will be of most use to practitioners who wish to obtain a bird's-eye view of a subject before they tackle it in a special volume.

# Books Received.

*[The mention of a book in this column does not imply that no review will appear in a subsequent issue.]*

"Treatment of Mental Disorder", by Leo Alexander, M.D.; 1953. Philadelphia and London: W. B. Saunders Company. Melbourne: W. Ramsay (Surgical), Limited. 10" × 6½", pp. 518, with 142 illustrations. Price: £4 15s.

Intended for students of medicine and physicians, and especially for neuro-psychiatrists about to enter their period of training.

"Statistical Tables: For Biological, Agricultural and Medical Research", by Ronald A. Fisher, Sc.D., F.R.S., and Frank Yates, Sc.D., F.R.S.; Fourth Edition; 1953. Edinburgh: Oliver and Boyd. London: Macmillan and Company, Limited. 11½" × 9", pp. 138. Price: 21s.

Contains the tables needed by a statistical department in the solution of problems with which it may have to deal.

"Laboratory Technique in Biology and Medicine", by E. V. Cowdry; Third Edition; 1952. London: Baillière, Tindall and Cox. 9½" × 6½", pp. 414. Price: 35s.

Stated in the preface to be "an entré [*sic*] to microscopic technique".

"Medicine", edited by Hugh G. Garland, T.D., M.D., F.R.C.P., and William Phillips, M.D., B.Sc., F.R.C.P., with a foreword by F. A. E. Crew, T.D., M.D., D.Sc., Ph.D., F.R.S.; 1953. London: Macmillan and Company, Limited. In two volumes. 10" × 7", pp. 2178, with 238 illustrations. Price: £6.

A British text-book of medicine by British authors.

"American Pocket Medical Dictionary"; Nineteenth Edition; 1953. Philadelphia and London: W. B. Saunders Company. Melbourne: W. Ramsay (Surgical), Limited. 7" × 5", pp. 644. Price: £1 11s. plain, £1 15s. 9d. with thumb index.

"A Dictionary of the Principal Terms Used in Medicine, Nursing, Pharmacy, Dentistry, Veterinary Science, and Allied Biological Science."

"Lectures on the Scientific Basis of Medicine", British Post-graduate Medical Federation, University of London; 1953. Volume I, 1951-52. London: University of London: The Athlone Press. Sydney: Walter Standish and Sons. 9" × 6", pp. 404, with six plates and 85 text figures. Price: 30s.

These are 18 of the 39 lectures delivered during the winter of 1951-1952.

"Current Therapy, 1953: Latest Approved Methods of Treatment for the Practising Physician", edited by Howard F. Conn., M.D.; 1953. Philadelphia and London: W. B. Saunders Company. Melbourne: W. Ramsay (Surgical), Limited. 10½" × 8", pp. 868. Price: £5 4s. 6d.

Current therapy is discussed by 209 contributors, the whole range of subjects being divided into sixteen sections.

The Medical Journal of Australia

SATURDAY, JULY 4, 1953.

*All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.*

*References to articles and books should be carefully checked. In a reference the following information should be given without abbreviation: surname of author, initials of author, year, full title of article, name of journal without abbreviation, volume, number of first page of the article. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.*

*Authors who are not accustomed to preparing drawings or photographic prints for reproduction are invited to seek the advice of the Editor.*

## EXPERIMENTATION ON HUMAN BEINGS.

A GREAT deal of our present-day medical knowledge has been obtained as a result of experiment. Sometimes the experiment has been confined to laboratory procedures, and sometimes animals are used, but we find quite often that before long an experiment has to be made on a human being. On October 10, 1951, a symposium was held at the University of California School of Medicine, San Francisco, on the problem of experimentation on human beings. Four papers presented are published in *Science* of February 27, 1953. Experiments, whether they are carried out on animals or men, involve certain ethical considerations. The matter would at first appear to be quite simple. Many persons would say that provided an individual volunteered for the experiment, nothing more was required. Then, too, we have to determine how a volunteer is to be described. A man may consent to undergo certain experimental procedures because of a reward that is promised to him, or to escape certain penalties should he not consent. Such a man would not be a true volunteer. Again, we have to determine how far such experimentation should be allowed to go, how far the individual should allow himself to be experimented on, from the point of view both of his own responsibilities and of his own personal safety. Obviously a child cannot be a volunteer, because a child could not understand the nature of the experimentation before he was subjected to it. This has to be carefully remembered in connexion with research on such subjects as poliomyelitis. During the Second World War, most barbarous procedures were carried out on men, women and children in Germany by German doctors at the command of high Nazi officials. Those who are interested will find a grim list of procedures set out in a leading article in *The Journal of the American Medical Association* of November 23, 1946, on page 714.

The first paper in the San Francisco symposium was by Michael B. Shimkin, of the University of California School of Medicine. He discussed the problem from the point of view of the research worker. He pointed out at the beginning of his address that certain medical experimentation on human beings, in its broadest meaning and for the good of the individual patient, took place continually in the doctor's consulting room. For this reason, the general question of human experimentation was one of degree rather than of kind. He declared that whenever human beings were to experiment on human beings, the *mores* of human conduct, including ethical, religious and legal considerations, could not, and should not, be ignored or minimized. As the general rules of conduct to be utilized in the determination of whether human beings should be experimented on, he quoted the rules made at the famous Nuremburg medical trial. He quoted them *verbatim* as follows.

1. The voluntary consent of the human subject is absolutely essential. This means that the person involved should have legal capacity to give consent; should be so situated as to be able to exercise free power of choice, without the intervention of any element of force, fraud, deceit, duress, overreaching, or other ulterior form of constraint or correction; and should have sufficient knowledge and comprehension of the elements of the subject matter involved as to enable him to make an understanding and enlightened decision. This latter element requires that before the acceptance of an affirmative decision by the experimental subject there should be made known to him the nature, duration and purpose of the experiment; the method and means by which it is to be conducted; all inconveniences and hazards reasonably to be expected; and the effects upon his health or person which may possibly come from his participation in the experiment.

The duty and responsibility for ascertaining the quality of the consent rests upon each individual who initiates, directs, or engages in the experiment. It is a personal duty and responsibility which may not be delegated to another with impunity.

2. The experiment should be such as to yield fruitful results for the good of society, unprocurable by other methods or means of study, and not random and unnecessary in nature.

3. The experiment should be so designed and based on the results of animal experimentation and a knowledge of the natural history of the disease or other problem under study that the anticipated results will justify the performance of the experiment.

4. The experiment should be so conducted as to avoid all unnecessary physical and mental suffering and injury.

5. No experiment should be conducted where there is an *a priori* reason to believe that death or disabling injury will occur; except, perhaps, in those experiments where the experimental physicians also serve as subjects.

6. The degree of risk to be taken should never exceed that determined by the humanitarian importance of the problem to be solved by the experiment.

7. Proper preparations should be made and adequate facilities provided to protect the experimental subject against even remote possibilities of injury, disability, or death.

8. The experiment should be conducted only by scientifically qualified persons. The highest degree of skill and care should be required through all stages of the experiment of those who conduct or engage in the experiment.

9. During the course of the experiment the human subject should be at liberty to bring the experiment to an end if he has reached the physical or mental state where continuation of the experiment seems to him to be impossible.

10. During the course of the experiment the scientist in charge must be prepared to terminate the experiment at any stage, if he has probable cause to believe, in the exercise of the good faith, superior skill, and careful judgement required of him, that a continuation of the experiment is likely to result in injury, disability, or death to the experimental subject.

Shimkin also quoted rules in regard to experimentation which have been laid down by the Judicial Council of the American Medical Association.[1] According to these rules,

[1] *J.A.M.A.*, 1946, 132: 1090.

three requirements have to be observed as follows: (i) The voluntary consent of the person on whom the experiment is to be performed must be obtained. (ii) The danger of each experiment must be previously investigated by animal experimentation. (iii) The experiments must be performed under proper medical protection and management. In discussing these requirements, Shimkin states that "the investigators and the subjects are human beings with entirely equal and inalienable rights that supersede any consideration of science or public welfare". He further thinks that research on human beings is too hazardous and implies too many responsibilities to be undertaken by a lone investigator; it should be a group effort, supported by a proper consultative body. He thinks that even experimentation on oneself without such collaboration and consultation is indefensible. He admits that the principle may be modified by several factors, such as the condition of the subject and the type of the experiment. It is common experience, for instance, to have the sufferer from an obviously fatal disease demand that something should be done which would advance knowledge, although it might not be to his personal advantage. Perhaps Shimkin's most important dictum is that the application of principles to specific experimental situations is open to individual interpretation and differences, and he insists (we have quoted him on a previous occasion) that science *per se* is neither moral nor immoral; it becomes moral or immoral only as moral or immoral human beings use its powerful techniques. This is something which it would be well for us always to keep in mind. We might also remember a fact stated in a recent address by J. V. Pulvertaft[1] that medicine can never become fully scientific unless it becomes completely inhuman.

The problem was discussed at the symposium from the physician's point of view by Otto B. Guttentag. He had some interesting remarks to make about the patient-physician relationship. He pointed out that the relationship of one performing experiments of no immediate value to the person under observation was impersonal and objective because of the character of the research. Experimentation is the basis on which the two meet. This is quite a different relationship from that which exists between a physician and a sick person. This is the original, and indeed the basic justification for the medical profession. Objective experimentation to confirm or disprove some doubtful or suggested biological generalization is foreign to this relationship. Guttentag makes a nice differentiation between the two facets of the physician as the physician-experimenter and the physician-friend. Referring to the application of force, he states that this presents no problem in American culture. We may say the same of our own culture. Most physician-experimenters, if not thoroughly aware of the nature of the original patient-physician relationship, "are so deeply rooted in the democratic spirit that they agree, and will continue to agree, that the use of force is not justified on a single person, even if millions of other lives could be saved by such an act". In regard to those who are hopelessly incurable, he asserts that experimentation requires a tremendous amount of self-criticism, self-discipline, and understanding of life's essential attributes, lest it be perverted to unconscious barbarity. In regard to the increased technicalities of the present day, the following point is obvious: even in the field of daily practice, it may be asserted that after explanations of the seriousness of an operation and the nature of the patient's disease, it has been "agreed" between patient and physician that an operation shall take place; but such assertions can be true only in the vaguest sense of the term "agree". "The agreement refers only to acts of commission and not to those of omission, and one has only to think of present-day specialization in medicine in order to realize that the patient is frequently not able to grasp all the implications of a certain procedure so far as his health is concerned." Only the spirit of the original patient-physician relationship can meet this situation.

The limits of the right of a person to consent to experimentation on himself were discussed at the symposium by Alexander M. Kidd. We know that no medical practitioner may treat or operate on a human being without his consent. "It makes no difference that the person needs treatment or will die if he does not get it." When a patient is unconscious and needs immediate treatment, the treatment may be carried out, but even there, if the husband or wife or parent is present, consent may be necessary. Kidd states what may be regarded by some persons as a dilemma—if a doctor is not also a research man, he is not the best kind of a doctor; and if a research specialist is not interested in the welfare of the patient entrusted to him, he is not the best researcher. This has to do with ordinary illness. In regard to any experimentation solely for the advancement of science, we know that no person can legally consent to his own death. A person may not consent to serious injury amounting to a maim. The point about any experiment is that the person concerned must give his or her consent, but there must be no coercion about the obtaining of this consent. We can see how important this is in the matter of prisoners. Pulvertaft, in the address already mentioned, remarked that no scientific doctor should ask another to "volunteer" for measures in which he did not share. He admitted that in publications dealing with experiments, he always sought for evidence that the writer had satisfied his curiosity in the first instance by experimenting on himself. Pulvertaft stated that in medicine, and above all in scientific medicine, it should never be forgotten that in the ultimate analysis the only significant problem was the interest, both immediate and remote, of "one frightened patient". He said that if we forfeited the trust imposed in us by allowing the anonymity of our age (our present-day age) to hide the unique personality of the patient, we might learn much, and more quickly, of the nature of disease, but that we should have lost a friend. In conclusion, we might do well to think of what Albert Schweitzer has written about the principle of the "reverence for life" as being the only possible basis of civilization. Schweitzer writes:

> But to everyone, in whatever state of life he finds himself, the ethic of respect for life does this: it forces him ever and again to be inwardly concerned with all the human destinies and all the other life-destinies which are going on through their life course around him, and to give himself, as man, to the man who needs a fellow-man.

If we have reverence for life, we shall oppose false ethics and false ideals, we shall preserve our humanity, and we shall not go astray in such matters as human experimentation.

[1] *Lancet*, November 1, 1952.

# Current Comment.

## NERVE SIGNALS.

PROFESSOR BERNHARD KATZ opens his inaugural lecture[1] in the recently established Chair of Biophysics at University College, London, with a fitting tribute to A. V. Hill, the biophysicist *par excellence*. As a physiologist the lecturer evades the difficulty of defining biophysics by adopting a purely functional criterion: "biophysics is what a biophysicist does". He then proceeds to provide some insight on his own particular brand of the biophysics of the nervous system.

His lecture is concerned with different methods of nervous signalling. Many would object that there is only one form of such signalling, namely, a simple "dot" system proceeding according to the explosive "all or nothing" principle. Katz, however, devotes much attention to what he regards as a second form of signalling. For a proper understanding of this some preliminary attention must be directed towards the more generally recognized type.

There is still a widespread tendency—with, it must be allowed, some justification—to look upon a nerve fibre as analogous to a telephone or telegraph cable. However, no self-respecting electrical engineer would contemplate constructing such a cable out of water and a few ionizable salts. Nor would his employer be satisfied with the result which gives a conductivity of about one million times less and a leakage about one million times greater than in a good commercial cable. The analogy is obviously remote. On results, however, the apparently inferior nerve fibre must possess some considerable merits.

As is well known, the fibre comprises essentially a core of axoplasm surrounded by a membrane. The fluid within the membrane contains a preponderance of potassium ions, the fluid outside has mainly sodium ions. Inside, the electrical charge is negative, outside positive, and there is a potential difference of about one-tenth of a volt across the membrane. Passage of an impulse along the fibre depends upon the strength of the stimulus applied. If this is subthreshold it produces a weak excitation which spreads only a few millimetres. This type of response has a special importance which will appear later. However, when the stimulus reaches or exceeds threshold strength an impulse is propagated explosively throughout the length of the fibre. Conduction of the impulse is caused, or at least accompanied, by electro-chemical changes. Sodium ions pass in through the enclosing membrane and the local potential difference is reversed. This process takes only a few thousandths of a second. Then the original ion distribution is restored in a further few thousandths of a second—the so-called refractory period.

In the present context, the important points are that the nerve impulse elicited is self-amplifying and self-sustaining, while the mechanism is self-regenerating. The impulse is set off at an adequate energy level, it is maintained at this level by ionic activity along the length of the fibre, and finally, the original chemical arrangement is automatically restored, ready for propagation of the next impulse, after a very short interval. Such a result has not so far been achieved by man-made cables; but there are disadvantages, too. The nervous response is unvarying in strength and one-way in direction, and requires a multiplicity of channels to attain its ends.

The surface membrane of the nerve fibre clearly plays a decisive part in the transmission of impulses. It is necessary, therefore, to add that no such membrane can be demonstrated anatomically. Katz asserts that nothing so gross as what the microscope reveals could be more than a mere supporting structure. This rather disconcerts those who attach some importance to such a gross entity as, say, the myelin sheath. Wilfred Trotter was probably the first to suggest that this might serve as an insulator. Windle has certainly demonstrated that nerve fibres can conduct before they acquire their myelin sheath, but such conduction was not of the normal kind. The existence of differential times of myelination more than suggests a functional significance, for example, when the optic nerve fibres myelinate as they come into visual activity. Also, as Young has shown, the thickness of the myelin sheath does bear some relationship to the rate of conduction within the fibre. Quite a number of observers, we feel, will not be prepared so readily to dismiss the myelin sheath, at least, as a mere skeletal support.

Having thus registered a minor protest against what appears to be a too sweeping generalization, we may pass on to consider what Katz regards as a second form of signalling in the nervous system. We have already noted that a subliminal stimulus excites only a weak and transient local impulse. It is now known that the response at a synapse on receipt of a full nerve impulse is often of a similarly weak nature—subthreshold in intensity and exciting only a few millimetres of the next nerve fibre. This may be due to local inhibitory influences at the synapse. At all events, it is totally different from the ordinary explosive all-or-nothing response, and herein lies its importance. The full impulse is invariable, unadaptable to changing nuances in the exciting situation. But in its reduced form at the synapse the impulse is susceptible to modulation: it may be suppressed altogether or suffer other changes, or it may summate with other subliminal stimuli to a strength which can bridge the synaptic gap and ensure transmission to the next link in the chain. Not all impulses impinging upon a synapse are reduced in intensity. Some pass straight through to excite the next neuron immediately, for example, in a reflex through an anterior horn cell where the preliminary sorting out has been accomplished at antecedent synapses. There is, however, considerable evidence that in a great many cases synaptic transmission may undergo the delay, reduction and changes just described. Here, then, are two complementary forms of signalling. The one supplies the crude basic structure and energy, the other—at the cost of a slight delay—provides for a flexibility of response in closer adaptation to the situation. It is not possible to say that either component is more important than the other, but evidently it is the synaptic link which endows the nervous system with its possibilities for increasing complexity and, thus, with its major interest for the neurophysiologist.

At this point the lecturer's main thesis is disposed of, but he touches upon some other issues of considerable interest. Since this is an inaugural lecture, it is necessarily semi-popular in style, avoiding too great detail and much controversy. At the same time, there are many points upon which Professor Katz could have given an authoritative opinion and such opinion would have been welcome, but this he largely eschews. In one case, however, he does commit himself. That is in the dispute over electrical *versus* chemical transmission across the synapse. Here he is definitely on the chemical side. Two main reasons are given. First, when only a few small endings impinge upon a large nerve cell there is insufficient contact to provide the energy for a purely electrical transmission; apparently only the release of a chemical agent would suffice. And second, the release of chemical agents appears to provide nicely for the partial inhibition which afflicts many nerve impulses at synapses. To those familiar with the almost mystical claims sometimes made for synaptic potentialities these reasons alone may seem inadequate.

A point which must strike the critical reader of any modern work on neurophysiology is the crucial importance now attached to the nerve fibre membrane and to the synapse. Modern neurophysiological theory is, in fact, completely dependent upon those two structures. Consequently, it is unfortunate that neither can be conclusively shown to have any real existence. At the moment, their presence is purely inferential, to meet the theoretical demands of sundry biophysical and biochemical observations, and numerous measurements. Neurophysiology is very much in the stage of saying that nervous activity proceeds "as if" such structures exist. Perhaps the electron microscope or some other technique will settle

[1] "Different Forms of Signalling Employed by the Nervous System", *by Bernhard Katz; 1952. London: H. K. Lewis and* Company, Limited. 10" × 6½", pp. 18. Price: 4s.

this problem one way or the other. Certainly this should be a matter of major concern to the neurohistologist—perhaps the reality may prove more exciting than even the physiologist's postulates. In the meantime we may justly admire what the neurophysiologist has so far achieved. This, in turn, must lead to even greater admiration for the strange mixture of simplicity and complexity by which the nervous system fulfils its purpose.

## DOMESTIC FOOD CONSUMPTION IN ENGLAND.

THE first annual report by the National Food Survey Committee of the British Ministry of Food was published in November, 1952.[1] It was based on information collected during 1950; but it makes frequent reference to the long-term survey commenced in 1940 and continued through to 1949. The purpose of the earlier survey was to provide an independent check on the food consumption and expenditure of the population of the United Kingdom during the war. The earlier survey was limited to working class families, for it was assumed that they would be those most likely to be affected by wartime changes. The 1950 survey was, however, extended to cover a national sample that would represent, as far as possible, a complete cross section of the population. Comparisons are drawn between the results for working class families in 1950 and the information obtained in the previous years; so that in addition to broadening the basis of the study, this report also forms a link with the earlier studies.

In 1950 investigations were made into 4723 households in which there were 16,586 persons, and the data have been analysed on the basis of social class. This is admitted by the authors to be a difficult task, for since the war social class is less clearly defined than before the war. Sociologists have always felt that the partitioning of data by social classes in Australia was an unsatisfactory procedure.

The British group defined social classes on the income basis, using the following categories: Class A, more than £13 per week; Class B, £8 to £13 per week; Class C, £4 10s. to £8 per week; Class D, less than £4 10s., (*a*) all households, (*b*) old-age pensioner household. Comparison of the diets of working class families from 1946 to 1950 shows an improvement in all food items in 1950 compared with 1948 and 1949, which were difficult years owing to the financial crisis. The 1950 levels were all more satisfactory than the 1946 levels.

For those interested in individual figures, for all households the average amounts per head per day of energy value and nutrients were 1474 Calories, 78% total and 38% animal protein, 101 grammes of fat, 1066 milligrammes of calcium, 13·6 milligrammes of iron, 3536 international units of vitamin *A*, 151 milligrammes of vitamin *B*, 1·69 milligrammes of riboflavin, 13·0 milligrammes of nicotinic acid, 84 milligrammes of vitamin *C*, and 172 international units of vitamin *D*. No account was taken of cooking losses.

Probably the most interesting part of the report is the comparisons of household diets of social classes. The two upper social classes consumed more of the expensive foods like eggs, milk, fresh vegetables and fresh fruit than did the other classes. The uptake of rationed foods like meat and butter were similar in all groups. The differences between social classes were, however, smaller than the differences due to composition of family. The outstanding feature was the difference between the households with no children and those with several; this was so for fresh milk, eggs, meat and vegetables. The greater the number of children, the lower the *per capita* amounts of these foodstuffs available. In terms of money, less was spent *per capita* on the highly nutritious foods by the large families. This finding was also made by the nation-wide surveys made in Australia in 1938 and 1944. The households with the lowest expenditure per head were a miscellaneous group of old-age pensioners and households with one male and one female adult with three or more children.

The items of nutrients in the survey showed that on a *per capita* basis the diets of households with four or more children recorded a nutrient value about 30% to 20% below those of the childless families. However, the averages for this group of households did not fall below standards based on the British Medical Association's recommendations, 1950, except for total protein and calcium, which were 94% and 92% of the standards. Although the figures for the energy values of the diets of households in which there are adolescents and children fall short of estimated requirements, we would not be justified in assuming that the Calorie requirements of all members of these households were not provided. Under conditions prevailing in England now, we are justified in assuming that energy requirements would be met, whatever else was deficient. The relatively high levels of consumption and the comparatively small spread between social classes must afford considerable satisfaction to those responsible for the planning of food distribution in the United Kingdom.

[1] "Domestic Food Consumption and Expenditure, 1950, with a Supplement on Food Expenditure by Urban Working-Class Households, 1940-1949." Annual Report of the National Food Survey Committee; Ministry of Food; 1952. London: Her Majesty's Stationery Office. 9¼" × 6", pp. 130. Price: 4s. 6d.

## A RADIOLOGICAL STUDY OF THE CORONARY ARTERIES.

MODERN radiological technique has contributed much to our knowledge of the anatomy, physiology and pathology of the cardio-vascular system, as well as providing valuable diagnostic information. No part of the cardio-vascular system is more important than the coronary arteries, but until fairly recently little has been done towards visualizing them radiologically. A beautifully produced monograph by Lucio di Guglielmo and Mariano Guttadauro[1] describes and illustrates what has been achieved in this direction in the First Roentgen Department of Södersjukhuset, Stockholm, over the period 1947-1952. The basic technique is aortography, in which a contrast medium is introduced into the ascending aorta by means of a catheter inserted via the radial artery or the carotid artery (the latter route was used in a small group of patients and then abandoned). Guglielmo and Guttadauro state that if a correct technique is used, thoracic aortography should cause no disturbances except those connected with the toxicity of the contrast agent, and it always leads to contrast-filling of the coronary arteries. Failure may be ascribed to errors in technique or certain pathological conditions of the heart and great blood vessels. It has been found that visualization of the coronary arteries is occasionally obtained with angiocardiography in general, but the method is not reliable. Age and sex were found to have no effect on the contrast-filling of the coronary arteries in aortography. Guglielmo and Guttadauro state that in the majority of cases the filling and emptying of the coronary arteries and of the aortic bulb occur simultaneously, and that there is an obvious relationship between the visualization of the coronary arteries and the various phases of the cardiac cycle; the vessels of the heart were seen to be best visualized during ventricular diastole.

Turning to the findings of their studies, Guglielmo and Guttadauro point out that aortography provides us for the first time with the radiological appearances of the coronary arteries in the living subject. Almost all the principal ramifications described by the anatomists and even the minute arteries penetrating the interventricular septum may be recognized in the skiagram. The present observations are stated to tally generally with earlier anatomical descriptions. Nevertheless, a comparison of the findings in living and dead human subjects led to the discovery of some differences in the appearance and position of the ramifications of the left coronary artery. No variations have been noted in the number and origin of the coronary arteries. Differences were found in the mode of division of the left coronary artery, but such

[1] *Acta radiologica*, Supplementum 97, 1952.

variations are not frequent; and it appears that in the great majority of cases any particular vessel seen radiographically may be identified by reference to a "fundamental ideal representation" of the coronary system depicted in this monograph. The preponderance of one coronary artery described by the anatomists is verified in the studies on the living subject; preponderance of the right coronary artery appears to be somewhat commoner than that of the left. So far in these investigations it has not been found possible to make radiological observations, direct or indirect, which could contribute to studies of the anastomoses and collateral circulation of the coronary arteries.

Interesting and important as are the general anatomical findings from these studies, it will naturally be asked how far this technique may be used clinically. Introduction of a foreign substance into the coronary arteries is not a light matter, especially if those arteries are providing a barely adequate blood supply to the heart. Guglielmo and Guttadauro state that the length of time (2·5 to 4·0 seconds) during which the contrast medium remains in the coronary system is not appreciable, and therefore the possibility of development of any dangerous degree of anoxæmia must be small. Therefore, in the light of their findings, and especially in view of the fact that in none of their cases have any significant ill-effects been observed, they believe that coronary arteriography should also be employed diagnostically in the presence of coronary disease. However, they conclude with commendable caution that this would seem to hold true only when the investigation is carried out with proper equipment and with strict adherence to the technical desiderata. Perhaps further experience will produce definite clinical indications and contraindications for use of what many will feel is a somewhat awesome procedure.

## PERIPHLEBITIS IN EPIDEMIC FORM.

A COUPLE of years ago a series of cases of periphlebitis was observed in Huntington in Western Virginia of a type which eluded exact diagnosis, and an account of this has now been published by John S. Pearson.[1] This series was first noted during the autumn and winter of 1950-1951, and the illness was characterized by severe pain and tenderness over the superficial veins of the lower extremity in members of so restricted a community that a strong suggestion arose that the condition existed in epidemic form. The patients were student nurses; in all 22 were observed, and 19 of these came from one nurses' home. The signs and symptoms were those characteristic of thrombophlebitis. Pain was an outstanding symptom, and was of a disabling nature. Tenderness along the course of the superficial veins was obvious, and the veins themselves were hard and cord-like. Sometimes there was some degree of swelling of the limb. Slight constitutional symptoms occurred at times, such as lower abdominal pain, and headache, and the temperature was occasionally slightly raised. No tenderness of muscles could be elicited, nor was there any sign of involvement of arteries or of lymphatics. Several case reports are included in Pearson's article, which exemplify the condition, and in particular one interesting feature, the tendency to recurrence, or at least involvement of several veins in succession. Routine examination of the blood, particularly with regard to evidence of infection, and of the prothrombin content revealed no abnormality. In one of these patients who had recurrence of symptoms ligation of a vein was performed, and the surgeon noted that no thrombus was found in the vein, though the wall of the vessel was thickened. A month later a further recurrence took place in the opposite leg. After some weeks the condition slowly settled down. Two other young nurses were subjected to surgical exploration, but no thrombus was found in the veins. In one of these a paraspinal nerve block was carried out in order to test its effect on pain. Some relief was gained, but this did not last twenty-four hours. Treatment was at first on conservative lines, though this description might not have been considered quite apt a few years ago, as it included penicillin and other antibiotics, a vasodilator drug ("Priscoline") and dicoumarol. There was no evidence that any treatment influenced the course of the disease substantially. One patient had a profuse menstrual period after the administration of dicoumarol was begun; apparently there was a causal relation. It is interesting that one girl complained of pain in the chest, but X-ray examination revealed no lesion. This suggests a behaviour similar to that noted in the migrating type of thrombophlebitis. The effect of corticotropin (ACTH) was also tried, but no apparent change took place.

As the number of cases grew sustained efforts were made to find some pathological explanation for the syndrome, as its sex and age distribution and domiciliary occurrence strongly suggested a common and transmissible cause. Accordingly, the help of the Communicable Disease Laboratory of the National Institute was enlisted, and one patient was sent to a prominent clinic for the study of vascular disease. The results of investigation were completely negative. No bacterial cause was discovered, though evidence of an inflammatory disturbance was found in microscopic sections. The *vasa vasorum* were affected, and slight perivascular cuffing was seen. Thrombosis was not found in the ordinary sense, but there were leucocytic thrombi in the vessels involved, though the endothelium only showed some swelling. Unexplained periphlebitis is not so uncommon, and the cause of arteritis may also be obscure, but the epidemic nature of this outbreak warrants further interest. It has been noted that acute or recurrent phlebitis does not tend to result in the formation of emboli. When in the course of *thrombophlebitis migrans* distant involvement occurs it may be possible that this is due to activation of the inflammatory process elsewhere and not to embolism.

[1] *Circulation*, March, 1953.

## SOCIAL SERVICE AGENCIES IN VICTORIA.

MEDICAL PRACTITIONERS in Victoria will find much useful and interesting information in the "Directory of Social Services" recently published by the Victorian Council of Social Service. It provides essential information on hundreds of government and voluntary organizations, institutions and services contributing to the welfare of the community in Victoria. Charitable agencies are included, but there are a great many others as well. The two main groups are "statutory departments and agencies" (Commonwealth and State) and "voluntary organizations". Of particular medical interest is the information about institutions and agencies for the care of children, the aged and the mentally and physically handicapped, as well as hospitals and other agencies for the care of the sick. Many organizations listed have no obvious medical interest, but will be found helpful in the solution of quasi-medical problems that often come under the notice of the personal medical adviser. Every general practitioner and medical administrator should possess a copy of this directory and be familiar with its contents. It will be useful also to many others, especially psychiatrists and pædiatricians. Although the agencies listed are in Melbourne and its environs, many of their services are important to people outside the metropolitan area and should be known to country practitioners. The directory is obtainable from the Victorian Council of Social Service, 10 Queen Street, Melbourne.

## AN HISTORICAL INDEX.

THE manager of the Australasian Medical Publishing Company, Limited, has recently published an index of articles of historical interest published in THE MEDICAL JOURNAL OF AUSTRALIA from 1914 to 1952. The articles are quoted by title and are arranged according to the successive years in which they have appeared. The index covers 26 pages and some blanks are left for the inclusion of articles published after 1952. Copies are obtainable from the office of the company at five shillings each.

# Abstracts from Medical Literature.

## SURGERY.

### Retroperitoneal Rupture of the Duodenum.

ISIDORE COHN, HERBERT R. HAWTHORNE AND ALFRED S. FROBESE (*Am. J. Surg.*, September, 1952) review the condition of retroperitoneal rupture of the duodenum in non-penetrating abdominal trauma, and add a case of their own. They state that the usual causes include sudden, unexpected crushing injury of some kind, but occasionally it results from what appears to be a minor injury. The duodenum is well protected except where it crosses the spine. In the latter position, however, it is vulnerable to minor injury which may leave no sign on the abdominal wall. With some severe trauma other intraabdominal injuries may be present and confuse the diagnosis. Immediately after the injury the patient is frequently unconscious for a few minutes. Then there is usually complete recovery, but after several hours there may be nausea and vomiting. Abdominal pain begins and increases. The duration of the quiescent phase probably depends on the size of the tear, the secretory activity at the time of the rupture, the contents of the stomach at the time of the injury, and the amount of ileus produced by the blow itself. Rigidity is not a dependable sign. Hæmorrhage, if present, is usually due to an associated lesion. X-ray examination may show infiltration of the retroperitoneal tissues with air. The local treatment of the perforation depends mainly on its size. If it is possible to close the perforation without constricting the duodenum this should be done. If not, complete division of the duodenum and end-to-end anastomosis or division of the duodenum, closure and gastroenterostomy are indicated. In addition to closure of the duodenum, the retroperitoneal area must be drained.

### Diverticulitis and Carcinoma of the Sigmoid.

JOHN J. MORTON (*Surgery*, November, 1952) has studied a series of 18 cases in which both diverticulitis and carcinoma of the sigmoid colon were present and a similar series of acute complicated diverticulitis cases which were proved not to be associated with cancer only after radical resection and microscopic examination. He states that diverticulitis is usually readily diagnosed from the symptoms, physical examination, laboratory studies and characteristic X-ray findings. Complications which may arise, such as abscess, perforation, peritonitis, obstruction, or fistula, tend to obscure the clear-cut picture and may render it quite confusing if accompanied by bleeding. In cases of complicated diverticulitis and of inflammatory carcinoma all the radiological signs may fail. The barium cannot be retained, and none can be made to pass beyond the recto-sigmoid junction in many instances. No diverticula can be demonstrated, and the nodular appearance of cancer cannot be shown. All that the radiologist can say under such circumstances is that there is an obstruction at the recto-sigmoid junction the nature of which he cannot determine. Occasionally, a small quantity of barium may pass the spasm or obstructed area giving imperfect filling of the sigmoid. Flecks of barium may be interpreted as diverticula when they really represent ulcerations in a carcinoma. Or the imperfect filling may simulate the filling defects of neoplasm when due to spasm alone. The diagnosis in the final analysis depends upon the microscopic picture. The coexistence of diverticulitis or diverticulosis and cancer in the sigmoid colon is considered quite rare. There is no evidence that diverticulitis is a precursor of cancer. The probability of the two conditions existing together is to be expected.

### Rubber Tubing and Healing of Common Duct Anastomoses.

BANNING G. LARY AND JOHN R. SCHEIBE (*Surgery*, November, 1952) describe an investigation of the effects of drainage with rubber tubing on common bile duct anastomoses in dogs. Dilatation of the common duct was produced by simple ligation for seven days, and then the common duct was freed for a centimetre and transected. Anastomosis was carried out with interrupted chromicized catgut on atraumatic needles. In 20 animals a "Latex" rubber "T" tube was inserted in the common duct above the anastomosis. In 24 animals an anastomosis was performed without the help of a "T" tube. In 12 of these animals the abdominal cavity was drained, in the other 12 no drainage was used. In animals in which no drainage was used the mortality rate from biliary peritonitis was higher. The use of the "T" tube was found to be associated with stricture-formation in 11 out of 12 animals which were sacrificed, and in only three out of 16 animals without "T" tubes. Microscopic examination of sections revealed increased fibrosis and leucocytic reactions in the wall of common ducts in which a "T" tube had remained for two weeks. Also, bacterial infection of the bile in the gall-bladder was found to be more common in the presence of a "T" tube.

### Explosions in the Colon during Electrodesiccation.

H. GRAY CARTER (*Am. J. Surg.*, November, 1952) reports a case in which, during electrodesiccation of polypi at the recto-sigmoid junction, accumulated gases exploded and produced lacerations of the splenic flexure. Emergency laparotomy and resection of the descending colon were required, and the patient recovered. Chemical and bacteriological analyses of the stool revealed no abnormalities to account for any increased amount of intestinal gas. Normally, intestinal gases contain a large proportion of hydrogen, methane and hydrogen sulphide, all of which are inflammable; and the question is asked why this type of accident does not occur more commonly.

### Segmental Colitis.

MARTIN A. HOWARD (*West. J. Surg.*, November, 1952) believes that segmental or regional colitis is generally more insidious and benign than the idiopathic type of diffuse chronic ulcerative colitis. Also, segmental colitis is more easily curable by early and adequate surgery (that is, partial colectomy). Segmental colitis is more prominent in the caecum and ascending colon, but occurs throughout the entire colon with the exception of the rectum. The involved mucous membrane appears granulomatous, and frequently lymph nodes measuring one to two centimetres in diameter are found in the mesentery draining the diseased segment. The symptoms usually include diarrhœa, with or without the passage of blood, and there may be abdominal pain with the urge to defæcate. Perforation, intestinal obstruction and fistula-formation all occur occasionally. A barium enema examination readily reveals the diagnosis and shows the extent of involvement of the colon. If the disease has progressed enough, a moth-eaten border of the outline of the colon with shortening of the lumen and definite lack of haustral markings may be found in the defective part of the large bowel.

### Hepatic and Splenic Artery Ligation.

E. J. JAHNKE, S. F. SEELEY AND E. D. PALMER (*Ann. Surg.*, January, 1953) discuss the various methods of treatment of portal hypertension and conclude that hepatic and splenic artery ligation should be employed as an alternative measure when, because of severe liver dysfunction, the shunt operations are contraindicated. Ligation of the hepatic and splenic arteries increases the flow of portal blood to the liver and creates a new capillary bed. Studies on regenerating liver have shown the importance of an adequate portal, rather than arterial, blood-flow to the liver. The hepatic artery should be ligated distal to all its branches to avoid the collateral circulation; and as between 32% and 40% of subjects possess accessory hepatic arteries, these should be searched for and divided. A case is reported in which the portal pressure was recorded as 418 millimetres of water. After ligation of the hepatic artery it fell to 330 millimetres, and after ligation of the splenic artery it fell to 282 millimetres. Thirty minutes later the pressure was 180 millimetres. Although the pressure in the œsophageal varices fell after the operation, it rose again in the next ten months; but so far there has been no recurrence of the ascites or hæmatemesis.

### Surgical Conditions of the Male Breast.

W. WALLACE GREENE (*West. J. Surg.*, December, 1952) reports a series of cases of lesions of the male breast. He states that carcinoma of the breast occurs in the ratio of one male to 96 females. In half his male cases (four out of eight) there was a history of injury. Because of the structure of the male breast, with its little fatty and glandular tissue, carcinoma is apt to cause skin and nipple changes earlier than in the female. This early attachment helps in differentiating the condition from benign lesions, but the only safe diagnostic procedure is biopsy. Carcinoma of the male breast has been described when œstrogens have been used in the treatment of carcinoma of the prostate. The treatment of carcinoma of the male breast is

essentially the same as in the female, but the prognosis should be better, for treatment may be instituted early. Infections in the male breast are not very common. These include tuberculosis, syphilis and abscess. "Gynæcomastia" is a term better avoided, for there are many conditions causing enlargement of the male breast, and each should be recognized and labelled as such. "Hypertrophy of the male breast" is a better term for hypertrophy of the glandular tissue. This is usually associated with a considerable increase in the periductal connective tissue. Fibroadenoma is probably the best term for those hypertrophied breasts with definite nodular masses, especially when they are encapsulated. The hypertrophy which occasionally occurs in elderly males is thought to be due to the inadequacy of the testicles with a relative increase in the œstrogen secretion. Hypertrophy is also found in cases of atrophy of one or both testes from other causes. Neoplasms of the testis may result in hypertrophy of the breasts. Hypertrophy of the breasts has been found in patients suffering from nutritional deficiencies and chronic debilitating diseases. It is also found in patients suffering from subacute liver disease and from cirrhosis of the liver.

### Gastrectomy for Perforated Ulcer.

GEORGE CARAYANNOPOULOS AND CHRISTOS CHRISTOPOULOS (*Surgery*, November, 1952) discuss the indications for immediate partial gastrectomy in the treatment of perforated peptic ulcers. The arguments in favour of this method of treatment are summarized as follows: by this operation the patient gets rid of the ulcer and its attendant complaints; the period in hospital is shortened and a second operation is avoidable; the operation is technically easy and the closure of the duodenal stump sure, since the ulcer usually occurs on the anterior surface of the stomach or the duodenum and near the pylorus, while a second operation is more difficult owing to the formation of adhesions especially on a drained wound. However, it is admitted that in some cases the more conservative methods of treatment may save the life of the patient, and that this is the primary function of the operation rather than permanently curing the patient of a long-standing disease. In the authors' series of 98 cases of perforated peptic ulcer treated by several surgeons, 56 gastrectomies were performed with two deaths, 39 patients were treated by simple closure of the perforation with 11 deaths, and three were treated by continuous aspiration without a fatality. Simple closure was reserved for those patients in whom, because of the length of time since the operation, it was feared that peritonitis might be present and for those patients whose general condition was poor because of cardiac, pulmonary, hepatic, renal and other disorders.

### Cat Scratch Disease.

F. G. MACMURRAY, M. C. SANFORD AND T. WINSHIP (*Am. J. Surg.*, October, 1952) state that for twenty years Dr. Lee Foshay has recognized, but not reported, a specific entity, cat scratch disease, which he first differentiated from ulcero-glandular tularæmia. In the past two years, the disease has been studied further and its characteristics have been defined. The surgeon who encounters an unexplained instance of regional adenopathy should inquire into the patient's contact with cats, obtain antigen to perform an intradermal test and search the biopsy specimen for the histological features seen in this disease. The authors present the details of a case, that of a four-year-old girl who had developed a small firm lump in the suprasternal notch. It was thought to be malignant, and was excised, and the frozen section was reported as showing "malignant tumour filled with small round cells, exact nature undetermined". The permanent sections, however, detailed description of which is given, suggested cat scratch disease, *lymphopathia venereum* or tularæmia. An intradermal test with cat scratch antigen was performed, and the result was positive. Further inquiry into the history elicited the fact of close contact of the child with two kittens and the presence of a maculo-papule on the chin ten days before the suprasternal mass was discovered. The authors state that, typically, the disease is characterized by the appearance of an initial cutaneous lesion at the site of the cat scratch, followed a few days later by the development of regional lymphadenitis, which often proceeds to suppuration with sterile pus. The nodes most frequently involved are the epitrochlear and axillary, the femoral and the inguinal, but the anterior and posterior cervical, submental, submaxillary and occipital glands may be involved. They may remain movable and non-tender, or they may become involved in periadenitis with tenderness, heat and swelling. The disease may last weeks or months, and there may or may not be systemic symptoms. Definitive diagnosis is made by means of a specific intradermal test. Pus obtained from a suppurative node is prepared according to the original Frei test and used as the antigen. It is of interest that the sera of many patients with cat scratch disease give a positive complement-fixation reaction with the virus of *lymphogranuloma venereum*. As regards the skin test, however, there is no cross reaction between the two diseases. This affliction has certainly masqueraded in the past as a variety of other diseases—ulcero-glandular tularæmia, tuberculous cervical adenitis, infectious mononucleosis, lymphosarcoma and Hodgkin's disease. It is important that it be recognized, since it may be easily confused with more serious ailments.

### Modern Trends in Biliary Surgery.

R. J. MCNEILL LOVE (*Brit. J. Surg.*, November, 1952) has reviewed the present position of the various operations on the gall-bladder. Cholecystostomy is said to have a place in treatment when the gall-bladder is contracted and buried in adhesions, especially if the patient is fat or frail. Cholecysto-enterostomy may be a life-saving operation for an impacted stone in the common duct when the condition of the patient prohibits any prolonged surgical intervention (such as choledochostomy). Cholecysto-gastrostomy is inadvisable, not only because the anastomosis of a thin-walled gall-bladder to a thick-walled stomach presents some technical difficulty, but also because the discharge of bile into the stomach stimulates rapid emptying and so induces constant hunger. Partial cholecystectomy with coagulation of the remaining mucosa is useful if the gall-bladder is difficult of access, especially if it tends to be buried in the liver. Also, in cases of acute cholecystitis with partial gangrene of the gall-bladder, removal of the free portion with coagulation of the part adherent to the liver is the method of choice. Standard cholecystectomy has an average mortality of about 2% in skilled hands. The diathermy knife is advised for dissecting the gall-bladder from its bed. When this is complete, the peritoneal flaps are approximated with a continuous suture, and the abdomen is closed without drainage. During the operation pressure on the calves is avoided lest it lead to pulmonary embolism. If a patient subsequently develops a massive embolus, an immediate injection of papaverine may relax the associated arterial spasm and so tide him over the crisis. It is advised that in every ward where embolism may occur, papaverine (one grain) in a sterile syringe should be kept in the drug cupboard for immediate administration to any patient who is seized with sudden dyspnœa and severe collapse.

### Pectus Excavatum.

G. E. LINDSKOG AND W. L. FELTON (*Surg., Gynec. & Obst.*, November, 1952) state that *pectus excavatum* consists of a depression of the lower part of the sternum and adjacent costal cartilages, beginning at the manubrio-gladiolar junction and reaching its maximum depth at the xiphoid process. The deformity is usually congenital, and it may be progressive in degree until skeletal maturity is reached. The ætiology is not established, but rickets is not an ætiological factor. *Pectus excavatum* is usually asymptomatic. However, individuals with this deformity are typically of asthenic habits, are sometimes poorly nourished and usually display poor posture. Often they show decreased resistance to infection, and chronic pulmonary disease, such as bronchitis and bronchiectasis, may be associated with advanced cases. However, a minority of patients have symptoms resulting from the deformity. These are cardiac, such as dyspnœa, precordial pain, palpitation and rarely decompensation, or pulmonary, including dyspnœa, cyanosis and cough. In 1939 Brown placed the operative treatment of this lesion on a firm basis. Therapeutically, he recognized two groups of cases. The first comprised those in subjects under two years of age, who may be improved by a limited operation consisting of division of the diaphragmatic and ligamentous attachments of the sternum. The second included those in older patients, who require a more extensive procedure consisting of (1) freeing of the sternum through a mid-line incision, (ii) resection of the depressive costal cartilages throughout the extent of the deformity, (iii) transverse osteotomy at the level of the manubrio-gladiolar junction with elevation of the depressed sternum, and (iv) fixation of the sternum in the position of correction with or without external traction. The authors furnish the details of eight patients operated on for this condition. They conclude that the operation is safe and should be recommended when indicated for orthopædic, physiological or cosmetic reasons.

# Special Articles for the Clinician.

(CONTRIBUTED BY REQUEST.)

## LXIX.
## RHEUMATIC FEVER.

IN the following article the description of the malady known as rheumatic fever has been confined to its evidence and effects in childhood; for while the disease may and does occasionally make its initial attack in early adult life, the onset is far more commonly encountered in the young child, and it is in this age period that the various manifestations are most frequently to be found that may happily leave the victim unscathed or lead to either early or late invalidism. During recent years this disease has been the subject of many communications and has been comprehensively discussed in a review from the Royal College of Physicians published in *The Lancet*.

The term rheumatic fever has been preferred because it suggests the existence of an inflammatory process without emphasizing the nature or course of the illness, which is not invariably acute, but is often a rheumatic state lasting for months, even for years, and characterized by cycles of activity and relapse. The carditis essentially is what determines the serious nature of rheumatic fever. It is the carditis that must be regarded as the most important and almost invariable associated manifestation; for although arthritis and chorea are frequent components, they are by no means inevitable.

### Importance of Rheumatic Fever.

#### *The Community.*

It has been stated that nearly 3% of the school population in England and Scotland is affected. Although the proportion in Australia does not appear to be so large, the incidence of the disease does seem to have increased during recent years. It is certainly the principal cause of heart disease under the age of forty years. Early recognition and early treatment therefore become matters of prime importance.

#### *The Individual.*

The disease is of long duration and usually makes its initial attack between the ages of four and fifteen years. Many factors are probably involved, some of which have not yet been determined, but there appears to be little doubt as to the effect of inherited susceptibility. The disease has sometimes an insidious onset, but is typically characterized by a series of recurrences following recovery from the initial attack. Almost invariably the heart is involved. The extent of cardiac damage governs the ultimate prognosis, and this is based on the number and severity of the recurrences. These recurrences tend to diminish in number and severity after puberty. Not infrequently evidence of heart disease of rheumatic origin is discovered in patients whose past history contains no illness recognizable as rheumatic fever.

#### *The Social Aspect.*

The poorer classes appear to be more commonly affected, a fact suggesting the influence of other factors, such as resistance to infection, exposure, nutrition, housing conditions and the like.

### Nature of Rheumatic Fever.

#### *Pathology.*

Rheumatic fever affects especially connective tissue. The changes are (*a*) degenerative, that is, in heart valves, and (*b*) inflammatory, a focal reaction, that is, pericardial, myocardial and elsewhere. The latter is typified by the Aschoff nodule. Rheumatic fever, although principally affecting the heart, attacks the whole body structure.

#### *Ætiology.*

While many theories regarding rheumatic fever have been advanced, including those describing it as a virus infection, an allergic reaction and an infection caused by the hæmolytic streptococcus, it is the latter that is still generally accepted as the most likely cause. This infection may be so mild as to escape notice, but usually takes the form of some upper respiratory tract involvement occurring one to three weeks before the development of rheumatic fever.

#### *Onset.*

The first attack in children occurs commonly between the ages of four and ten years, the attacks diminishing in frequency thereafter, and declining after the age of fifteen years.

Various modes of onset may be described:

1. Insidious—with fatigue, loss of energy, loss of weight, pallor, vague pains in joints, low-grade pyrexia, sometimes abdominal pains and headaches, raised erythrocyte sedimentation rate and raised sleeping pulse rate.

2. With arthritis—frequently affecting one joint only and in such cases often the hip joint, associated with all grades of the disease including high fever, carditis and pericarditis.

3. With carditis, as the first evidence. This may occur without arthritis or any precedent history. Tachycardia, cardiac enlargement, cardiac murmurs, fever and nodules may be found.

4. With chorea. This seldom occurs with arthritic manifestation; temperature may be normal with normal erythrocyte sedimentation rate. The heart may become involved during the episode of chorea, with alteration of temperature and elevation of erythrocyte sedimentation rate.

It is true that emphasis is to be laid on the carditis as the essential lesion, but it must be remembered that there can be many combinations and permutations of the various manifestations; so that patients may present in any of the above-mentioned ways, subsequently exhibiting other evidences of the disease.

#### *General Signs.*

General signs are as follows:

1. Pyrexia. This varies often in relation to the general signs and degree of activity. Recurrent rises in temperature coincide with relapses and further joint or cardiac involvement. Even with a normal chart, a raised erythrocyte sedimentation rate may be present and indicates that the disease is active.

2. Arthritis. In New South Wales experience suggests that a monarticular type of arthritis is more frequent, and that the hot, red, swollen, tender joint is not common. Typically, however, there is polyarthritis affecting the larger joints, and the above signs may be found.

3. Nodules. These are insensitive and more easily felt than seen, varying in diameter from less than 0·2 centimetre to 2·0 centimetres on the knees, elbows, knuckles and ankles, and over the spine and occiput, and when demonstrated indicate the existence of active carditis.

4. Loss of weight.

5. Weakness. This is generalized in character.

6. Anæmia. This is moderate in degree, and hypochromic and microcytic in type, with a leucocytosis between 10,000 and 15,000 cells per cubic millimetre.

7. Increase in erythrocyte sedimentation rate.

#### *Carditis.*

Cardiac involvement may be evident in the following ways:

1. Tachycardia. This is usually found, varying in rate from 100 to 160 a minute with a relatively high sleeping pulse rate. It is perhaps the most significant evidence of cardiac involvement. Return to normal rate is to be regarded as a good indication of satisfactory convalescence.

2. Murmurs. These are most probably due in the initial stage to valvulitis. The most common is a systolic murmur, loudest at the apex, variable in pitch and intensity, but usually soft, almost musical. A diastolic murmur sometimes occurs in the mitral region, possibly due to cardiac dilatation rather than mitral stenosis, and is indicative of rheumatic disease present or past. While the period of active carditis is unsuitable to diagnose particular valvular lesions, a presystolic murmur at the apex or a diastolic murmur at the base will indicate that mitral stenosis or aortic regurgitation has already developed. Such development, however, is usually a very gradual process, extending over some years, and the exact time of its occurrence is difficult to determine from physical signs. The typical *crescendo* presystolic murmur characteristic of mitral stenosis in the adult is not often encountered in childhood, even after several recur-

rences of rheumatic fever. Lesions of both mitral and aortic valves may occur in the same patient, but again clinical evidence of this is only forthcoming after an indefinite period. It should be remembered that in the absence of other confirmatory or typical signs an apical systolic murmur cannot be regarded as presumptive evidence of rheumatic fever. It should nevertheless be most carefully investigated.

3. Pericarditis. This may develop during any exacerbation of the disease and is recognized by the to-and-fro friction rub. Effusion rarely assumes proportions requiring paracentesis, but the signs of cardiac failure may follow rapidly. Abdominal pain, liver enlargement, dyspnœa and vomiting are among the important evidences of developing cardiac failure.

4. Cardiac enlargement.

5. Electrocardiographic changes. The electrocardiogram may show a prolonged *P-R* interval, changes in the *S-T* segments and *T* waves, and abnormal axis deviation. Auricular fibrillation is uncommon, but triple rhythm may be found and occasionally arrhythmias due to dropped beats.

### *Chorea.*

Chorea is a cerebral form of rheumatic fever which may be accompanied by carditis. Girls are affected more than boys. The onset is insidious, with emotional instability, restlessness and purposeless irregular movements, often unilateral and involving mostly the upper extremity. During school age deterioration in writing or inability to perform the finer manual movements may be the first evidence. Grimacing and jerky movements of the tongue are often early manifestations, so that speech and swallowing may be affected. There is a tendency to oppose the thumb to the fingers and palm when the patient is asked to extend the arms in front with outstretched fingers. The wrists and fingers are hyperextended during this manœuvre. Degrees of involvement range from mild to extreme and the condition may even lead to paresis. Recurrence is common. In the absence of carditis the temperature, pulse rate, blood count and erythrocyte sedimentation rate are within normal limits.

## Differential Diagnosis.

In the differential diagnosis, the following must be considered in relation to the principal signs and symptoms: rheumatoid arthritis; acute and chronic arthritis (infective); syphilitic hydrarthrosis; acute leuchæmia; osteomyelitis; poliomyelitis; scurvy; the cardiac manifestations occurring in severe anæmia or pyrexia; congenital heart disease; "innocent" murmurs; any disease that causes symptoms of low grade infection, such as tuberculosis; habit spasm; appendicitis, when the abdominal pains are the early symptoms.

## Prognosis.

Relapses are very common. The younger the patient the more likely the disease is to recur and the more certain the ultimate cardiac involvement, even to the extent of congestive cardiac failure. Relapses are more commonly found in the year following the attack. Persistent pyrexia, extreme tachycardia, increasing anæmia, vomiting, enlargement of the liver and severe loss of weight are all of grave import. Subacute bacterial endocarditis and congestive cardiac failure are possible complications.

## Treatment.

### *General.*

*Rest in Bed.*—Rest in bed is necessary for a minimum of six weeks with graded recumbency and activity according to presence of carditis and evidence of recovery. Occupational therapy and even educational instruction have a place during convalescence.

*Diet.*—Diet should consist of milk and milk foods initially, leading to a generous mixed diet.

*Salicylates.*—Sodium salicylate, 30 to 100 grains, or acetyl salicylic acid, 15 to 60 grains, should be given daily according to age in divided doses.

*Cortisone.*—Cortisone may be given in selected cases. Patients with rheumatic fever who have polyarthritis but no carditis should not be treated with cortisone or corticotropin. In such cases salicylate is the drug of choice. Patients who have rheumatic heart disease which is inactive need not be given hormonal therapy. Patients who have mild, active, chronic rheumatic carditis of many months' duration will benefit little from these agents. Adrenal cortical hormones are not indicated in the cases of advanced heart disease and congestive heart failure in which failure is on a mechanical basis and not due to active carditis. The patients most suitable for hormonal therapy are those with active carditis of recent onset (less than three months) during the initial or recurrent attack of rheumatic fever. The presence of congestive heart failure is no contraindication to the use of cortisone, but extra caution is needed in its exhibition.

### *Duration of Rest in Bed.*

The patient suffering from carditis requires probably three months' rest in bed at least. Convalescence is judged by the return to normal of the temperature, pulse rate, blood count and erythrocyte sedimentation rate and by increase in weight. Persistence of the systolic murmur is of little value in gauging the immediate recovery. Not uncommonly the murmur alters in character, becomes softer, and may entirely disappear. Conversely, when the initial damage has been severe or there have been further episodes, the murmur persists and eventually assumes the typical character of the established lesion. In many cases, after early increase the size of the heart reverts to normal measurements, but varying degrees of enlargement may remain.

### *Return to Activity.*

If the heart is only slightly affected, the degree of physical activity is governed by an attempt to prevent further attacks rather than by the state of the heart, and consideration must be given to the question of morale and the effect on the growing child of prohibiting him from the maximum participation in the normal modes of exercise. It is as good for a child with early rheumatic disease to exert himself up to the point of breathlessness as it is for one with a normal heart. When the heart is more damaged, stricter limitation is required, but the same principle is observed. In this connexion, however, the damage of repeated attacks and latent attacks when carditis is not recognized or adequately treated must be realized. Rheumatic heart failure is almost always due to a return of active carditis and not to an inevitable failure of a damaged heart.

The foregoing remarks have a very practical application when patients can be referred to a recovery home. When such an institution is available it forms a valuable transition between the hospital and the domestic home. It is advisable for the patient to continue the midday rest period in conjunction with gradual resumption of physical activity until the medical adviser is satisfied with the patient's condition. Children of school age may return to school in due course, at first for the half-day, increasing gradually to full time. This will necessarily be governed by geographical considerations, proximity of the school to the home and facilities for travel, as well as by the child's reaction. There should be no participation in competitive sport. The patient should be kept under regular supervision at appropriate intervals for many years. It is also advisable to give early thought to the choice of future career and to discuss with the parents the limitations imposed by the malady.

### *Prophylaxis.*

Excessive and unnecessary fatigue should be avoided. Any infection incurred should receive special care and sources of chronic sepsis should be removed. No routine removal of tonsils is indicated. If the tonsils are diseased, then tonsillectomy should be performed. Penicillin cover preferably should be employed in all operations dealing with the removal of septic foci.

Both sulphonamides and penicillin may be employed as prophylactics. Use of sulphonamides as a prophylactic measure should begin in the quiescent period following a major episode and should continue during the recurrent susceptible years. Recent authoritative statements on the prevention of rheumatic fever have advocated commencement of prophylactic therapy earlier in the disease and continuance in children at least to the age of eighteen years; in all those above this age for a minimum of five years from their last attack. A daily dose of 0·5 to 1·0 gramme of sulphadiazine is commonly used. A smaller dose should be given to children weighing under sixty pounds. These patients should be supervised, and regular leucocyte counts have been advised for the first two months, after which the occurrence of agranulocytosis is very rare. Toxic reactions are infrequent. Skin rashes, sore throats and a leucopenia of below 4000 cells per cubic millimetre with polymorphonuclear neutrophile cells below 35% may occur. If any of these develop, sulphadiazine administra-

tion should be suspended and the patient carefully watched. The claims for the satisfactory use of prophylactic doses of penicillin in similar cases are at present being investigated. Results so far are encouraging, but the widespread employment at present of this antibiotic appears likely to involve such expense and difficulties that its general application may not be feasible. Possibly some combination of sulphadiazine and penicillin prophylaxis may be developed.

W. P. MACCALLUM,
Sydney.

### Reference.

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## Medical Societies.

### MELBOURNE PÆDIATRIC SOCIETY.

A MEETING of the Melbourne Pædiatric Society was held at the Children's Hospital, Melbourne, on December 10, 1952.

### Congenital Nephrogenic Diabetes Insipidus.

DR. W. B. MACDONALD presented the case of a male infant who had been admitted to hospital shortly after birth with pyrexia and failure to thrive. Investigations in the Clinical Research Unit had identified the child's complaint as one of congenital pitressin-resistant *diabetes insipidus* of renal origin, a condition named *"diabetes dyshalus"* by Dr. Vivian Tappan after discussion with Professor Sigerist at Johns Hopkins Hospital in 1943.

Dr. Macdonald said that there were three main reasons for presenting the case. Firstly, it represented a definite syndrome, one which had been infrequently described, but was probably commoner than was realized, and furthermore one in which the prognosis was good. Secondly, investigations had brought forth and confirmed some interesting fundamental physiological facts. Thirdly, a survey of the literature had shown no description of the condition outside the United States of America. The first description was that of Waring, Kajdi and Tappan at Johns Hopkins Hospital in 1943; later, Williams and Henry, from Boston, and Dancis, Birmingham and Leslie, from New York, had described cases.

The condition was congenital and probably familial, and was found predominantly in male subjects, the case described by Dancis *et alii* being the sole one in a female subject. The usual presenting features were dehydration, irregular temperature, vomiting during the early months of life, polyuria, polydipsia and persistent constipation. Dehydration rapidly developed if fluids were reduced or withheld, and there was an inability to excrete urine of a high specific gravity, despite the administration of pitressin. High values were found for serum sodium and chloride concentration.

In the present case, R.S., a male, was admitted to hospital at the age of three months on August 10, 1951, with failure to thrive and pyrexia of unknown origin, the temperature being 101° to 103° F. Pyrexia, constipation, polyuria and occasional vomiting had been noticed by the mother since shortly after birth. There was no family history of a similar condition. Physical examination by many observers and numerous investigations failed to reveal the cause of the pyrexia, and after several months a diagnosis was still wanting. Serum electrolyte studies carried out because of evidence of clinical dehydration revealed considerable hypernatræmia and hyperchloræmia without acidosis, the concentrations on repeated occasions being of the order of 168 to 175 milliequivalents per litre of sodium, and 128 to 133 milliequivalents per litre of chloride. Following this, subsequent investigations were carried out in the Clinical Research Unit. Observations showed that on withholding fluid, dehydration ensued within a few hours. As there was no evidence of osmotic diuresis a *diabetes insipidus*-like state was diagnosed, but this proved to be resistant to pitressin on several occasions, different preparations in more than adequate dosage being tried without effect. The antidiuretic hormone titre of the infant's serum determined by means of the Burn test was found to be of a high-normal value.

The condition from which the infant was suffering appeared to be a pitressin-resistant form of *diabetes insipidus*, probably renal in origin. Although polyuria and dehydration on deprivation of water were noticed, thirst was not an obvious feature.

Dr. Macdonald demonstrated, by means of charts, the response of the patient to an ingested water load of 360 mils (an arbitrary amount which the infant could tolerate) compared with that of a control of approximately similar age and weight. He said that although in the control there was a typical delay in diuresis until the second hour, diuresis commenced in the patient shortly after ingestion of the load. The total urine volumes were approximately equal in each child, and approached the volume of water ingested. However, with the same water load, but with, in addition, five pressor units of pitressin, the response, although of the same order in the patient, was entirely different in the control, only 35 millilitres of urine being excreted. The procedure repeated after eliminating osmotic diuresis by feeding the child on glucose water for eleven days until the urine specific gravity was 1·001 gave almost identical results.

Numerous renal function tests were performed to determine the integrity of other aspects of renal function, and to confirm or disprove the existence of a generalized renal disorder. These tests failed to reveal any such disorder, and indicated that, apart from the abnormality of water reabsorption, renal function was sound. There had been no albuminuria, glycosuria or microscopic abnormality in the urine despite examinations on 20 to 30 occasions. The blood urea concentration fluctuated considerably according to hydration and diet and ranged from nine to 146 milligrammes *per centum*, the level usually being 50 to 70 milligrammes *per centum*. The mean of three inulin clearances was 93 mils per minute, of three endogenous creatinine clearances 83 mils per minute, and of three endogenous urea clearances at rapid urine flow 60 mils per minute, corrected to a surface area of 1·73 square metres. The wide variety in blood urea concentration was attributed to changing glomerular filtration rates according to the degree of hydration. This might occur in atrophic infants whose surface area was relatively large compared to body weight, in contrast to adults in whom the filtration rate was stable. TM (maximum tubular excretory capacity) estimations were not carried out, but the results of phenol red tubular excretion tests were normal, with a rapid excretion early. These were confirmed by excretion pyelography, in which, despite the diuresis always present in the infant, "Uriodone" excretion was sufficiently good to provide an excellent outline of renal pelves and calyces within five minutes of injection of the dye. The renal outlines in size and shape and the anatomy of the pelves and calyces were normal. Tubular ammonia production in response to ingestion of ammonium chloride was good, and was accompanied by conservation of urinary sodium. After a period of eleven days of a glucose and water diet, sodium and potassium conservation in the urine was almost complete, being less than one milliequivalent per twenty-four hours for both. Balance studies revealed that the child was in slight positive balance for sodium, potassium and chloride through the whole period. The urine was usually acid in reaction, the pH usually ranging from 5·0 to 5·5. The bicarbonate and total carbon dioxide content of the urine was negligible. Apart from the fluctuating blood levels and slightly subnormal clearances, for which there appeared to be an adequate explanation, there was no evidence of abnormal renal function sufficient to suggest a diffuse generalized renal disorder. The clinical and biochemical data could in no way support an osmotic diuresis as being the sole cause of water depletion, although nitrogenous retention may have secondarily contributed to the state. Also the salt-losing nephritis of Thorn was completely eliminated.

Further investigations showed no evidence of endocrine disorders, adrenal, anterior pituitary or thyroid. Urinary 17-ketosteroid excretion, glucose tolerance curves, response to administration of desoxycorticosterone acetate compared to a control, skiagrams and tomograms showed no abnormalities. Oral administration of isotonic sodium chloride and sodium lactate solutions resulted in a rapid diuresis of hypotonic urine in the patient, whereas controls excreted minimal amounts of highly concentrated urine.

Dr. Macdonald exhibited charts which demonstrated the differences in volumes excreted and the relative similarity in total electrolyte excretion. However, serum electrolyte concentrations, sodium and chloride, and sodium and bicarbonate respectively, showed a considerable increase to the order of 10 milliequivalents per litre in the patient, but remained unchanged in the controls.

Dr. Macdonald went on to say that the efficacy of pitressin in all respects except water reabsorption was demonstrated by its effect on peripheral vascular constriction and smooth muscle activity. It was impracticable to record the blood pressure at that time, but under conditions favourable to examination it was normally 88 to 92 millimetres of mercury, systolic, and 60 millimetres, diastolic. The natriuretic effect of pitressin was similarly demonstrated, and there appeared to be a significant difference when compared to urine sodium concentration without pitressin.

Dr. Macdonald demonstrated that in the case under discussion there was evidence that anti-diuretic hormone acted by reinforcing an intrinsic tubular mechanism for water reabsorption in the distal nephron. This had previously been pointed out by other workers, notably Shannon.

The underlying disorder in the child being considered appeared to be distal tubular inability to react to anti-diuretic hormone, which was apparently present in normal concentrations. That could possibly have been due to either a developmental defect in the distal tubules, so that they resembled the kidneys of fresh-water fishes, or an intrinsic enzymic deficiency. Both those alternatives would be difficult to prove or disprove, especially as the expectation of life was fairly good.

With adequate hydration the infant had improved considerably and was able to forgo intragastric tube feeding through the night, although by morning there were signs of dehydration. He had not gained weight satisfactorily, was below the average height for his age, and had muscle hypotonicity, all of which had been noticed by the workers who had described the previous cases. There was also evidence that his mental age was not normal. His improvement, however, was progressive, and the clinical course of his condition did not resemble that of a generalized organic renal disease.

Dr. Macdonald, in conclusion, mentioned the limitations of methods in clinical research especially when one was dealing with infants, and especially with renal clearance studies in infants. However, most of the results were sufficiently clear-cut to be significant, if only qualitatively.

PROFESSOR R. D. WRIGHT congratulated the Clinical Research Unit on the investigation of the case. He said that the condition could be included amongst the hereditary defects of metabolism and was probably due to a defect in the use of anti-diuretic hormone in the reinforcement of enzymic processes responsible for the distal tubular reabsorption of water. A comparable condition was the failure of utilization of insulin in some cases of *diabetes mellitus*, as demonstrated recently by Bornstein. The course of the pyrexia might have been due to failure of heat loss by evaporation of sweat, or possibly insufficient loss by radiation. There might be a defect in the sweat glands of the child. It was essential that the child should be reviewed at intervals, as further studies over the years might throw more light on the mechanism of water reabsorption.

## Symposium on Tetanus.

### *Epidemiology.*

DR. PHILIP LANGTON-LOCKTON, of the Victorian State Department of Health, spoke of the unreliability of notification of tetanus as an indication of the incidence, which was best checked from case reports of admissions to metropolitan hospitals. Inquiries in Melbourne showed that there had been 237 deaths in twenty years; and consequently, since the mortality was about 50%, that 500 clinically recognizable cases had occurred. In the whole series there was no case of tetanus which could be shown to have occurred after a prophylactic injection of anti-tetanus serum. Prophylaxis was therefore of definite value, and accounted for the fact that the majority of cases followed on trivial injuries which had been overlooked. The cases showed no particular distribution, but were scattered fairly uniformly throughout the State. Soil conditions and agricultural procedures seemed, therefore, to have no significance in that respect.

The importance of the investigation, however, was the fact that tetanus was an obvious cause of death in children and adults, and that the number of deaths from the disease, in the past four years at least, was comparable to that from diphtheria. It was suggested that those deaths were preventible by the administration of anti-tetanus serum in all cases of injury. The use of tetanus toxoid, preferably combined with "P.T.A.P.", as an active prophylactic measure not only gave virtually a complete protection against tetanus but avoided the risk of anaphylaxis attendant on the use of anti-tetanus serum, and was thus safer.

### *Clinical Features.*

DR. A. W. VENABLES said that in the Children's Hospital, tetanus was a relatively infrequent disease, but carried a high mortality rate. Since 1945 there had been only 20 cases, six of them in 1949. Seven of the 20 patients had died. All children affected were aged eighteen months or more, and 16 were boys.

The clinical picture of fully developed tetanus was well known and should be easily recognized. *Clostridium tetani*, multiplying in a focus in the body, produced exotoxin. That was absorbed and gradually accumulated during a latent or incubation period. Damage to nervous tissue ultimately led to the symptoms of the disease. The symptoms could be divided into two groups, both of which occurred in most cases of tetanus. Firstly, there was a persistent increase in tone of various muscle groups. That led to a number of features—trismus, fixed facial expression (*risus sardonicus*), neck and back stiffness, and abdominal rigidity. In some cases there was quite obvious stiffness of the limbs. In some mild cases no further manifestations occurred. In the very mild form, known as local tetanus, rigidity was confined to muscle groups in the region of the wound. In most cases tonic muscular spasms were superimposed on the basic picture. In the fully developed spasm the jaw was tightly clenched, the neck and back were arched, the abdomen became tight, and the limbs went into an extensor spasm. Pain was a prominent feature. Spasms were usually quite short, but could persist for long enough to cause cyanosis by interference with respiration which resulted from forced contraction of the respiratory muscles. Spasms were initially evoked by reflex stimuli, such as a noise, handling, or treatment procedures. In severe cases they became frequent and apparently spontaneous.

The earliest symptoms were usually due to rigidity. Trismus was in the present series the most common initial symptom. In some cases the first complaint was of stiffness and soreness of the neck and back. In others a curious fixed grimacing facial appearance or a stiff gait was the first abnormality noted. Occasionally spasms appeared to precede obvious rigidity. In most cases they began after rigidity was first noted, at an interval varying from a few hours to several days. It was difficult sometimes to be quite certain about that interval, as early in the course of the illness spasms were often mild and involved only certain muscle groups. They could therefore be difficult to recognize. The child might merely bite his tongue or fall down suddenly. If a spasm occurred at night, the only evidence might be a sudden cry of pain or a fall out of bed. Spasms of the abdominal muscles might present simply as recurrent abdominal pain. Such spasms were commonly recognized only in retrospect. It was important, nevertheless, to be aware of them to assess the rate of progression of the disease.

The usual course was one of increase in severity, frequency and ease of development of spasms up to a stage which determined the overall severity of the illness. Subsequently spasms became less severe, and finally rigidity was lost. In the cases in which the patient survived at the Children's Hospital the total course had varied between ten days and five weeks, irrespective of the treatment used.

Diagnosis was essentially a clinical problem and must be made from the features mentioned, in other words, from characteristic rigidity and spasms. The presence of an obvious wound or other focus was not essential to diagnosis. In six of the cases in the series there was either no evidence of any focus or superficial healed abrasions, and in one case varicella lesions were regarded as the probable site of infection. One child had two illnesses diagnosed as typical tetanus at an interval of fifteen months. On neither occasion was a focus found. Even when a wound was present, bacterial confirmation of the diagnosis by isolation of the organism was unusual. Furthermore, treatment could not be delayed while isolation was attempted.

Differential diagnosis fell into several main groups. Firstly, local conditions in the mouth might cause trismus. Those conditions were usually obvious, but the outside possibility of such a lesion being actually a focus for tetanus had to be remembered. Secondly, in certain cases of encephalitis the patient exhibited trismus and muscular spasms. In those children consciousness was impaired and there might be other physical signs. Tetanus did not ordinarily cause paralysis. In cephalic tetanus, with a focus in the cranial region, cranial nerve palsies occurred. Differentiation from other causes of bulbar palsy was then necessary. Confusion could arise from interpretation of spasms as convulsions.

Assessment of the potential severity of any case was made on a number of factors. The incubation period and the nature of the wound gave a guide to the degree of the infection and toxæmia. In the series presented the incubation period was shorter in fatal cases, reaching in them a maximum of nine days. The shortest period was five days. In those survivors in whom an incubation period could be calculated, there was variation from five to fourteen days. Retention of a foreign body in a wound for the whole or part of the incubation period occurred more commonly in the fatal cases. Cases with no obvious focus were in general less severe. Rate of progression of symptoms, more particularly spasms, was a better guide to prognosis than the time of onset of spasms in relation to rigidity. Unfavourable features were therefore a short incubation period following a wound with a retained foreign body, and a rapid progression of symptoms.

The seven deaths in the series all occurred within five days of the onset of symptoms. In one case it was due to asphyxia from a prolonged spasm. In the others, factors such as accumulation of tracheo-bronchial exudate contributed to anoxia. Two children who died had apnœic cyanotic attacks which occurred without relation to severe spasms. Recurrent anoxia and possible cerebral damage by the tetanus toxin itself were both possible causative factors of such medullary failure.

Management of the cases had proceeded along routine lines. Large doses of anti-tetanus serum had been combined with chemotherapy, with local surgical treatment of obvious foci and with measures directed towards suppression of spasms. None of those measures would undo the damage already done to nerve cells. Anti-tetanus serum should be given in adequate initial doses, either intramuscularly or intravenously, with modifications in method depending on evidence of sensitivity to horse serum. Intramuscular administration of the large volume of serum required was made much more tolerable by injecting hyaluronidase with the serum. The confusion which once existed about unit dosage had been abolished by making the international unit equal to the U.S.A. unit. Previously the international unit was only half the U.S.A. unit. If further anti-tetanus serum was considered necessary in severe cases it should be given early. Penicillin was the antibiotic which had been used. Terramycin was also effective against clostridia. Local surgery depended on the wound or focus found, and should be carried out as early as possible.

Suppression of spasms could be attempted by use of heavy sedation or by administration of relaxant drugs. The relaxants available were curare and related drugs, which acted on the myoneural junction, or "Myanesin", which acted on the spinal cord. Heavy sedation produced unconsciousness and therefore aggravated pulmonary complications. For that reason relaxant drugs were preferred. Neither sedation nor relaxants affected the underlying tendency to spasms or rigidity. They did not shorten the duration of the illness, although they did modify its course. Treatment must therefore be prolonged at least until the tendency to spasms had subsided. Since 1949, 11 patients with tetanus had been treated at the Children's Hospital with "Myanesin". Four patients had died. That was a mortality virtually the same as the overall mortality and also for those cases managed previously with paraldehyde and barbiturates. All the deaths were in rapidly progressive cases with a poor prognosis from the start. "Myanesin" had been given by continuous intravenous infusion in concentrations reaching a maximum of 16 grammes per litre (8·0 grammes per half-litre flask). Single intravenous injections of 0·5 to 1·0 gramme had been given at times to assess the probable efficacy of the drug. With even that concentration there had been no hæmoglobinuria and no particular trouble from venous thrombosis. The most unpleasant effect was that large doses depressed respiration. That created a problem principally when severe spasms forced the use of concentrations of 6·0 to 8·0 grammes per half-litre. With that concentration even moderate increases in infusion rate could lead to rapid administration of large amounts of the drug and consequently to respiratory depression. If that occurred in the phase of recovery from the anoxia of a severe spasm, the anoxic period was extended with considerable risk. Delayed recovery from spasms had been seen on several occasions when the rate of infusion was increased rapidly during and because of a severe spasm. Response to "Myanesin" had been found to vary considerably from case to case. In some, both spasms and rigidity were controlled almost completely. In others the patient continued to be rigid with mild spasms, but could then be satisfactorily managed with sedatives or analgesics, for example, codeine. "Myanesin" could be combined in the infusion with thiopentone. In other patients the disease progressed despite large doses of "Myanesin", and it was those who died. Management of those who survived obviously became much easier, even if suppression of spasms was incomplete. Tube-feeding usually remained necessary. "Flaxedil" and tubocurarine would introduce special problems, but might well help to control the condition of some of the patients who responded poorly to "Myanesin". Tracheotomy was at times indicated as an expedient for removing the excessive tracheo-bronchial exudate which often accumulated in the patients and aggravated anoxæmia.

Dr. Venables said that it could be seen that treatment was prolonged, difficult and unsatisfactory. For those reasons effective prophylaxis was to be preferred. Three patients in the series did actually present on the development of their original injuries. Of two with retained foreign bodies one was given anti-tetanus serum and the other penicillin *plus* one injection of tetanus toxoid (he had not previously been immunized). The other had a compound fracture of the finger; conservative surgical treatment was carried out unsuccessfully, and the finger was finally amputated, but the possibility of tetanus apparently was not considered. All three children subsequently died of tetanus.

### *A Neonatal Case.*

DR. JUNE PASH, of the Queen Victoria Hospital, reported the case history of a newborn baby who suffered from severe tetanus and responded to the administration of anti-tetanus serum and intravenous "Myanesin" therapy.

### *Bacteriology.*

DR. J. W. PERRY, in discussing the bacteriology, said that tetanus known in the time of Hippocrates and described by him had reached clinical maturity many centuries before the present day, but had assumed bacteriological maturity only late in the nineteenth century. The Japanese Kitasato had demonstrated the causal relationship between the tetanus bacillus and the disease in 1889. A few years before, other bacteriologists had demonstrated the transmissibility and the production of the disease in experimental animals by the infection of soil.

Literature on the subject of the laboratory aspects of tetanus infection and of the mode of transmission of the toxin in the nervous system was voluminous, and only two small facets would be mentioned. First, from the purely practical point of view a reminder of the mode of infection was pertinent. Spores could be introduced into animals without immediately producing disease; but the introduction of mechanical, chemical or bacteriological agents, if they were introduced simultaneously, resulted in active infection. The principles of surgical treatment of tetanus were based on that knowledge, and also the occurrence of latent tetanus could be explained thus.

The variety of agents which could be called adjuvants to the establishment of tetanus infection made the disease a risk whenever injury with tissue necrosis and contamination from the exterior occurred. Animal and human fæces sometimes contained tetanus bacilli, but variation occurred geographically and in relation to occupation. The resistance of tetanus spores to heat was so well known that the efficiency of sterilization equipment was occasionally submitted to the critical test of destroying tetanus spores. Therefore it was clear that in an institution in which surgical procedures were performed in the presence of even a minimum risk of tetanus, procedures of sterilization must be at an unassailable standard.

It was worthy of note also that in humans natural resistance to tetanus did not occur. Even survivors from clinical tetanus showed insufficient immunity to prevent reinfection. It did not seem, therefore, in spite of its infrequency, that with a disease the mortality of which was so high, there was any debate as to the desirability of immunization. The questions to be answered were when and how.

### *Active Immunization Against Tetanus.*

DR. EDGAR NORTH said that active immunization almost completely prevented tetanus in the armed forces of the United States of America and British countries, including Australia, during the second World War. Altogether there were 30 cases with 14 deaths in the United States army and navy and the British army in individuals who had received the prescribed basic course of immunization with tetanus toxoid. By contrast, the incidence of tetanus in the non-immunized German and Japanese armies was high. There were 53 cases alone amongst American-held German

prisoners of war in England during the period September 7 to October 2, 1944.

The difficulties associated with effective active immunization against tetanus in civilian and particularly in pædiatric practice were much greater than under military conditions. In the army, schedules of dosage together with the keeping and checking of records could be enforced and standard routine prophylactic measures carried out when the soldier received an injury—even a trivial one.

Regarding the need for active immunization in children, Pratt, of the Department of Pædiatrics, Harvard Medical School, had shown that the use of toxoid was the only way to lower substantially the incidence of tetanus, because most cases occurred after trivial injuries or after no apparent wound at all, and the patients were not seen by a doctor until symptoms of tetanus had developed.

In Queensland nearly twice as many deaths occurred from tetanus as from diphtheria, whilst in Victoria the mortality from each of those two infections was now about equal. Most of those tetanus deaths followed trivial injuries. The total number of deaths in Queensland was about 20 annually, compared with 14 in the United States army and navy and the British, Canadian and Australian armies combined during the war in actively immunized men.

The consensus of informed opinion in the United States of America and Canada was that children of all ages, including very young babies, responded well to tetanus toxoid, that side effects never occurred, and that every child should be actively immunized against tetanus. It seemed that immunization with tetanus toxoid might well become a routine public health measure throughout Australia. Queensland had already made a start. Tetanus toxoid could be given simultaneously with diphtheria toxoid, or with diphtheria toxoid and pertussis vaccine, without extra injections and without fear of increasing side effects. There was no simple test like the Schick test for determining susceptibility to tetanus. However, it could be assumed, with confidence, as a result of many laborious serum antibody titrations carried out in animal tests, that practically all individuals, apart from those artificially immunized, had less than 0·003 unit of tetanus antitoxin per ml of serum. There was a difference of opinion as to what constituted an adequate protective level of serum antitoxin. There were, however, sound reasons for believing that a level of about 0·1 to 0·2 unit of passively introduced antitoxin per ml would almost certainly give protection against onset of tetanus. A protective level following active immunization might be a good deal lower, but there was no definite proof. Assuming that 0·1 unit per ml was the level to aim for, what schedule of dosage of toxoid was necessary to achieve and maintain that titre? The war experience of the British and Americans indicated that the basic course should consist of three doses of fluid toxoid spaced four weeks apart, or two doses of fluid toxoid spaced four weeks apart, or two doses of toxoid adsorbed to a mineral carrier, for example, alum-precipitated toxoid, with an interval of about six weeks between them. In addition, a "routine booster dose" of toxoid should be given six to twelve months after the basic course. Careful studies had shown that after a full basic course of toxoid and the "routine booster", a serum antitoxin level of 0·1 unit per ml could be maintained for as long as five years. Some authorities, notably J. J. Miller, junior, maintained that in children further routine booster doses should be given every two years. However, a booster dose after five years was probably adequate. The possible need for those further "routine boosters" would not arise if it could be ensured that every previously actively immunized child received an "emergency booster" of toxoid when he was injured. It had been shown (Bigler) that children responded with a rapid rise of antitoxin to a "booster" given up to ten years after the last previous injection. Dr. North said that a few personal observations made in the last year had shown that adults also responded to a "booster" of toxoid after an interval of at least ten years.

Lastly, there was the question of what further specific measures should be taken when a previously adequately actively immunized child was injured. The balance of evidence suggested that if nothing further was done—and it certainly could not be if the child was not seen by a doctor—tetanus was most unlikely to develop. However, with wounds of a nature likely to be followed by tetanus, no risks should be taken if the child was seen by a doctor. The best indication of what treatment should be given was gained from war-time army experience. It seemed clear, as Miller had pointed out, that either the administration of an "emergency booster" dose of toxoid or a prophylactic dose of antitoxin would save lives. After mild trauma, the American practice of giving toxoid was to be preferred, as the risk of anaphylactic reactions from the injection of horse serum was thereby avoided. However, in those cases in which the risks of tetanus were greatest, according to Miller, both toxoid and antitoxin should be given simultaneously. He had shown that in individuals who had had toxoid previously, if antitoxin and toxoid were injected simultaneously but at separate sites, there was an immediate rise in the serum antitoxin level from the passive immunization, followed a few days later by a further and more sustained rise from the "booster" dose of toxoid. If the toxoid and serum were mixed in the same syringe and injected together, no secondary rise occurred, as one would expect.

Dr. North concluded by stressing the following points. In previously actively immunized persons who were wounded, the United States army and navy and the British army did not rely for complete protection on the serum antibody content already present. The Americans, like the Australian and Canadian armies, relied on the emergency booster of toxoid and the British on the extra protection afforded by prophylactic anti-tetanus serum. In the majority of actively immunized children reliance must be placed on the serum antitoxin level at the time of injury (and infection) because they were unlikely to be seen by a doctor. There was at present no evidence that in actively immunized persons, tetanus toxin was an effective antigen causing a rapid rise of antitoxin in the serum. After recovery from tetanus, antitoxic immunity had not been demonstrated. Second attacks of tetanus had been reported. The guardian of every child actively immunized against tetanus should be given a certificate to that effect.

DR. STANLEY WILLIAMS opened the discussion. Referring to the relaxant effect of "Myanesin", he expressed the opinion that although the survival rate had not improved from the time when sedation only was used, the control of spasms and general relief of symptoms had justified its use. The work done by Dr. North was of great value. Immunization of children with toxoid should be encouraged. Although the use of triple vaccine had distinct advantages, the correct dosage of the different components might be more difficult to regulate, and it seemed unwise to cloud the issue for the sake of convenience. Dr. Williams said that he thought that tetanus toxoid should be used alone.

DR. I. H. MCDONALD said that as an anæsthetist he wished to stress that the seven patients in the series who had died, had died as a result of anoxia directly or indirectly, and in addition the anoxia had not been treated as well as possible. Of the seven patients, two had died in acute spasm, and five as a result of anoxia associated with an increase of mucus in the respiratory tree, the spasms also contributing to that complication. A big problem in treatment was to prevent or reduce the spasms with the consequent anoxia. As a relaxant drug, "Myanesin" left much to be desired. It had been the practice to suppress the spasms by increasing the dose of "Myanesin"—that often resulted in the substitution of paresis for spasm of respiratory muscles, the end result being quite as dangerous. It was preferable to use a more potent type of drug, such as curare, "Flaxedil" or "Scoline", which would cause complete paralysis, and then to restore respiration by artificial means. That would require the constant presence of a skilled medical attendant. That procedure would reduce secretions in the respiratory tract, lessen the anoxia-producing spasms and thereby improve the mortality. Of the drugs mentioned, "Scoline" with its short period of action was probably the best. Because of the danger of aspiration of regurgitated stomach contents, the person carrying out artificial respiration must be prepared to pass an endotracheal tube. The use of "Myanesin" elixir was to be discouraged, as by its local anæsthetic effect it aided aspiration of regurgitated stomach contents.

DR. F. STONHAM said that many improvements in the treatment of tetanus were to be anticipated. Having had a wide experience in the treatment of tetanus in India, where there was a high incidence, he was of the opinion that the intravenous route was by far the most reliable, despite the recommendation of other means of administration in the Commonwealth Serum Laboratories' brochure. Referring to the treatment of the site of infection, Dr. Stonham said that it was desirable to excise the wound completely, or if that was not possible, at least to obtain adequate exposure and drainage. If a combination of sedative and muscle-relaxing drugs was used, there was the danger of giving neither in adequate doses. Tracheotomy should be used with caution. Its value might have been over-stressed. There were pulmonary complications other than aspiration pneumonia, such as pulmonary infarction as a result of emboli from thrombophlebitis in calf veins.

DR. J. L. STUBBE said that recent practice at the Royal Melbourne Hospital, in the treatment of severe cases of tetanus, was the use of "Flaxedil" combined with artificial respiration and tracheotomy. The dose of "Flaxedil" used was 160 to 200 units given four-hourly by the intravenous route.

DR. ROBERT LAWSON said that "Myanesin" was undoubtedly effective, but should be kept for severe cases. "Myanesin" developed an opalescence when mixed with water. The drug was produced commercially in a solution with 15% propylene glycol solution as solvent, and precipitation occurred on its addition to water. There was least precipitation in a 2% aqueous solution—for example, 200 mils of the commercial preparation added to 800 mils of isotonic saline. Dr. Lawson confirmed the value of tetanus toxoid for active immunization in children. He said that it avoided the development of sensitization to horse serum, which occurred with repeated injections of small doses of anti-tetanus serum.

PROFESSOR R. D. WRIGHT suggested that means of increasing the permeability of capillaries to horse serum might provide a field for investigation. Anti-tetanus serum might be relatively ineffective in many cases because of its failure to reach the toxin in the nervous system.

DR. M. L. POWELL asked Dr. North if alum-precipitated tetanus toxoid was available.

Dr. North, in reply, said that Commonwealth Serum Laboratories would shortly be producing a combined diphtheria and tetanus alum-precipitated toxoid. In reply to Dr. Stanley Williams, Dr. North said that in the United States of America and Canada over the last few years, the whole trend was towards multiple prophylaxis. There was now unanimity that tetanus and diphtheria toxoids were eminently suited to be given together. The combination was easy and useful. Possibly the inclusion of pertussis vaccine was open to question, but the triple prophylaxis was commonly used in America.

DR. E. V. KEOGH predicted that the routine administration of tetanus toxoid would make tetanus a disease of the past and preclude the need for symposia on the subject.

## Out of the Past.

*In this column will be published from time to time extracts, taken from medical journals, newspapers, official and historical records, diaries and so on, dealing with events connected with the early medical history of Australia.*

### MEDICAL CORONERS.[1]

[*The Australian Medical Gazette*, August, 1871.]

WE regret to notice that the charges of extravagance and partiality and the many other causes of complaint that from time to time have been made against some medical coroners are at length bearing their natural fruit. Several well-considered articles have recently appeared in the metropolitan papers reflecting in terms of severe but not undeserved reprehension on the greedy anxiety of some of these functionaries to put fees in their pockets by the holding of unnecessary inquests. They are also openly charged by the Press with, in many cases, wantonly outraging the feelings of relatives and friends by the ordering of needless post-mortem examinations in the interests of their favourites. It would apparently be too much to expect of some coroners that, where fees are in question, they should allow such paltry considerations as feelings of humanity, public decency or reverence for the dead to influence their conduct. To remedy such an undesirable state of things, it is proposed to transfer the duties heretofore discharged by coroners to the magistracy thereby effecting a large annual saving to the country. Under the proposed alteration it is believed that fully one-half of the inquests now held will be found sufficient, that the duties will be discharged with less partiality and more justice, and with an absence of the animus which has too often marked the conduct of some medical coroners in Victoria. It is melancholy to reflect that one of the few offices open to medical men in the public service of the country is destined to be lost to the profession through the misconduct of a few of its members. It would, however, be infinitely better, both for the public and the profession, that the duties of coroners should be transferred to the magistracy than to tolerate the waste of public money, the insolent behaviour, and the offensive partiality which has been too long permitted.

[1] From the original in the Mitchell Library, Sydney.

## Correspondence.

### SOME OBSERVATIONS ON THE USE OF "BREVIDIL E", A NEW MUSCULAR RELAXANT, IN ELECTRO-CONVULSIVE THERAPY AND A COMPARISON WITH SCOLINE.

SIR: I do not wish to comment on the facts given by Dr. Val T. Stephen in the first part of his letter (M. J. AUSTRALIA, May 30, 1953), but the opinions expressed in the second part I cannot allow to pass.

With respect to the status of unmodified electro-convulsions, in administering about 7000 such fits I have seen only one dislocation (a mandible, reduced before the patient was awake) and about six probable vertebral fractures (back pain for a few days). I have only given about 100 fits with relaxants, but in two patients where "Scoline" was used, circulatory collapse occurred within a minute of the cessation of the convulsion. This was evidenced by the complete disappearance of the radial pulse and loss of skin colour, and in each case required intravenous nikethamide, repeated, for its alleviation. Both cases had received artificial respiration with oxygen immediately before and after the convulsion. In one of these cases, this was not really remarkable, as she was being kept away from the verge of congestive heart failure with digitalis. The other, who received a relaxant because of quiescent pulmonary tuberculosis, was otherwise in good physical health, and has since been relaxed with "Eulissen P" and "Brevidil E" without incident. So I am much happier for my patient when giving the unmodified convulsion.

Only one of the 16 patients to whom I have given relaxants without thiopentone has objected to the sensation of the drug's action. This unfortunate lady received her "Scoline" at a time when the (over-elaborate) electro-convulsive therapy machine had ceased to function, and no other method for giving her oblivion of her paralysis was at hand. I agree with Dr. R. Ramsey Webb (M. J. AUSTRALIA, April 11, 1953) that the addition of thiopentone is generally undesirable, as it introduces an additional risk of its own.

As one who has been taught by Dr. Webb, I can assure Dr. Stephen that I have not met any doctor who is more kind to his patients, or considerate of their feelings, than is Dr. Webb. If I were to have convulsive therapy, I would prefer Dr. Webb's method.

Yours, etc.,

V. L. MATCHETT, M.B., B.S., D.P.M.

Mental Hospital,
Sunbury,
Victoria.

June 4, 1953.

### A COLLEGE OF GENERAL PRACTITIONERS.

SIR: A generation ago the majority of teachers of clinical subjects in our medical schools were men who had been general practitioners themselves. Yearly their number diminishes, and within a few years they will have vanished.

Many of us believe that it is imperative that a start be made in teaching general practice in our medical schools. The experience in England and Scotland proves that there are general practitioners who have the time and the ability to make good teachers. These men will help to preserve the traditions and art of general practice and will encourage an increasing proportion of the best of the graduates to enter general practice.

But some body is needed to give stimulus and direction to the teaching of general practice, and many of us believe that this is just what a College of General Practitioners could provide.

Recently the Ipswich and West Moreton Medical Association (British Medical Association) addressed a letter on the

subject to the General Practitioner Group of Queensland. The Ipswich Local Association urged the time was ripe for the formation of an Australian College of General Practitioners, and the General Practitioner Group of Queensland, after lengthy deliberation, agreed. It considered that such a College could be of immense benefit not only to general practitioners, but to medicine as a whole and to the community.

It endorsed the findings of the British General Practice Steering Committee (1952), namely, that such a College would give a lead to general practice, would assure its development along proper lines, would assist teaching and research in general practice, and would raise the status of and improve the quality of general practice in the same way as the Royal Colleges have done for the other specialties.

The ultimate objective to combine the four Colleges, namely, those of Physicians, Surgeons, Obstetricians and Gynæcologists, and General Practitioners, in an Academy of Medicine is surely a goal towards which we should aim, and our new College would look to the older Colleges for help and guidance.

The Queensland Council of the British Medical Association has now placed the subject of the formation of an Australian College of General Practitioners on its agenda of its forthcoming meeting in July with the Queensland Local Associations.

An interesting suggestion was made by the President of the Ipswich and West Moreton Medical Association (Dr. H. M. Saxby) that, since Melbourne has the headquarters of the Australasian College of Surgeons and Sydney that of the Australasian College of Physicians, Brisbane might appropriately have the headquarters of such an Australian College of General Practitioners. This would perhaps be considered so, since, as far as I know, the Queensland General Practitioner group, formed in the nineteen thirties by Dr. L. P. Winterbotham, is the only one of its kind in Australia which has had a continuous and active existence.

Yours, etc.,

H. S. PATTERSON,
Chairman, General Practitioner Group of Queensland.

Ipswich,
Queensland,
June 14, 1953.

## THE TREATMENT OF CHRONIC RHEUMATISM WITH "BUTAZOLIDIN".

SIR: I am disappointed that my paper of May 16 has provoked no discussion.

Will you allow me to invite your readers to send direct to me any reports they may have of interesting or anomalous effects of "Butazolidin", or of unusual cases of toxicity?

This valuable drug is still under study; it is specifically antirheumatic, but its dosage has not yet been generally agreed on. But it is perfectly safe if it is not given in excessive doses and if it is not given to patients with peptic ulcers, anæmia, heart failure or chronic nephritis.

Dosage should be guided by the response of the patient. If the pain is much reduced by the first dose of two pills, the drug should not be given again until the pain starts to come back. Optimal effects are secured by minimal dosage. By low dosage the patient can be kept almost symptom-free for long periods, whereas the pain often returns in a week or two if he continues unnecessarily to take two or three tablets a day.

In 340 cases, I have seen only 14 patients whose treatment had to be abandoned because of side effects. Eight of them had persistent dyspepsia, one (aged eighty) had recurrent swelling of the feet, and one had symptomless melæna. Two had hæmolytic anæmia requiring transfusion, and a third had hæmoglobin 60%. All three were previously known to be anæmic, and therefore should not have had "Butazolidin". One patient, who developed severe palpitation one night, had had auricular fibrillation before and therefore should not have been treated.

In my paper I mentioned a woman with a severe backache, who had a series of convulsions after taking five tablets. She is now proved to have secondary carcinomatous deposits in the spine, and probably in the brain. I am coming more and more to agree with Selbourne (*Brit. M. J.*, February 7, 1953, page 332) that the serious toxic effects of "Butazolidin" are usually due to over-dosage or to some other disease.

Finally, a correction. In your annotation of May 16 (page 708) you do not mention that Currie, of Glasgow, first described the antirheumatic effects of "Butazolidin" at Barcelona in September, 1951, nine months before Kuzell's report appeared.

Yours, etc.,

MICHAEL KELLY.

34 Queens Road,
Melbourne, S.C.2,
June 19, 1953.

## CHOLEDOCHODUODENOSTOMY.

SIR: Dr. Burt is to be complimented on drawing attention to the place of this procedure in the surgery of biliary obstruction.

In benign conditions since 1947 I have performed the operation 75 times, and in malignant states 20 times. This short-circuit was intended to replace the external biliary drainage established by a T-tube in the common bile duct, and which had failed to prevent repeated choledochotomy for non-calculous obstructive jaundice (due to benign fibrosis of the ampullary duct). In this fashion, it may be regarded merely as an extension of Sir Alexander McCormick's internal drainage of the biliary system after opening the common bile duct. Obviously technical difficulties prevent its use when the duct is small and in these cases transduodenal sphincterotomy (choledochotomy) is preferred. The operation is therefore indicated when the duct is dilated from an obstruction, which is likely to be recurrent if no permanent short-circuit is provided.

The predominance of Continental literature is due to the fact that English and American surgeons prefer the external drainage methods afforded by the T-tube, and are not persuaded that cholangitis does not occur as a sequela. The only explanation which I advance for the absence of cholangitis and recurrent obstruction following my short-circuits is technical. I cannot feel that continuous suturing is safe, and would regard the future of the stoma as directly related to the finesse of anastomosis. I prefer interrupted "0000" silk sutures with a second peritoneal layer.

Far from having no place in supraduodenal biliary stricture, I find it admirable in that it avoids two factors which, in my view, contribute to poor results, namely, wide stripping of the common bile duct and the insertion of any form of tube.

There remains to make some comment upon pancreatitis. It was the pancreatic failures following short-circuiting for recurrent obstructive jaundice of ductal origin (that is, those who continued to complain of pancreatic pain) that prompted an attack upon the orifice of the pancreatic duct, combined with internal biliary drainage (Starr, 1953). Comfort *et alii* (1948), of the Mayo Clinic, have reported 40% improved following short-circuits. These figures have not been duplicated in my series, nor can they compare in the properly selected case with the three-year results following the operation on the pancreatic orifice. One patient in my series showed great improvement (following short-circuiting) with choline therapy, showing that the hepatic-ductal-pancreatic metabolism is interrelated. In such operations upon the pancreatic duct, short-circuiting affords a degree of safety unattainable with T-tubes because of the danger of secondary hæmorrhage.

Dr. Graham (1953) has reported in this journal a fistula still patent after some eleven years.

With proper techniques this operation should represent a procedure of some value in our repertoire. There are few surgeons who will feel that our knowledge of the correct manner in which to deal with common bile duct affairs is yet standardized, nor our techniques replete. The failure of the T-tube (even when left *in situ* for some months) to obviate recurrent obstruction demands a new approach.

Yours, etc.,

K. W. STARR.

149 Macquarie Street,
Sydney,
June 9, 1953.

### References.

COMFORT, M., *et alii* (1948), "Chronic Relapsing Pancreatitis", *Gastroenterology*, 11: 1.

GRAHAM, F. (1953), "The Late Results of Choledocho-Gastrostomy with a Permanently Obstructed Ampulla of Vater", M. J. AUSTRALIA, 1: 106.

STARR, KENNETH (1953), Editorial, *Arch. Surg.*, in the press.

# Post-Graduate Work.

## THE POST-GRADUATE COMMITTEE IN MEDICINE IN THE UNIVERSITY OF SYDNEY.

### Week-End Course in Pædiatrics.

THE Post-Graduate Committee in Medicine in the University of Sydney announces that a week-end course in pædiatrics will be held in the lecture theatre, Royal Alexandra Hospital for Children, on Saturday and Sunday, September 5 and 6, 1953. The programme will be as follows:

Saturday, September 5: 9.15 a.m., "Allergic Problems of Infancy and Childhood and Their Treatment", Dr. S. E. L. Stening; 10.30 a.m., "Postural Defects, Feet and Shoes", Dr. C. Murray Maxwell; 11.30 a.m., "Medical Emergencies of the Newborn", Dr. Kathleen Winning; 12.30 p.m., film, "Care of the Premature Baby"; 1.45 p.m., "The General Practitioner's Approach to Congenital Heart Disease", Dr. C. W. G. Lee; 3 p.m., "Some Therapeutic Problems", Dr. S. E. J. Robertson; 4 p.m., "Funny Turns and Their Modern Treatment", Dr. D. G. Hamilton.

Sunday, September 6: 9.30 a.m., "Problems of Prevention and Treatment of Rheumatic Fever", Dr. Bryan Dowd; 10.45 a.m., "The Role of the General Practitioner in Accident Prevention", Dr. F. W. Clements; 11.45 a.m., "Hæmatological Problems, Including Acute Leuchæmia", Professor Lorimer Dods; 1.45 p.m., "The Treatment of Herniæ in Children", Dr. J. Steigrad; 3 p.m., film, "Intussusception"; 3.30 p.m., question time.

The supervisor of the course will be Professor Lorimer Dods, Director of the Institute of Child Health, and fee for attendance is £3 3s. Written application, enclosing remittance, should be forwarded to the Course Secretary, The Post-Graduate Committee in Medicine, 131 Macquarie Street, Sydney, not later than August 26, 1953. Telephones: BU 5238, BW 7483. Telegraphic address: "Postgrad, Sydney."

# Naval, Military and Air Force.

## APPOINTMENTS.

THE undermentioned appointments, changes *et cetera* have been promulgated in the *Commonwealth of Australia Gazette*, Number 37, of June 11, 1953.

### CITIZEN NAVAL FORCES OF THE COMMONWEALTH.

*Royal Australian Naval Reserve.*

*Appointment.*—James Dermott Villiers is appointed Surgeon Lieutenant, with seniority in rank of 1st March, 1949, dated 1st March, 1953.

### AUSTRALIAN MILITARY FORCES.

#### Australian Regular Army.

*Royal Australian Army Medical Corps.*

2/40068 Captain (Temporary Major) E. G. H. Manchester relinquishes the temporary rank of Major, and is transferred to the Reserve of Officers (Royal Australian Army Medical Corps (Medical)) (2nd Military District), 1st May, 1953.

#### Regular Army Special Reserve.

*Royal Australian Army Medical Corps.*

VX700263 Captain (provisionally) G. R. G. Prenderville relinquishes the provisional rank of Captain and is transferred to the Reserve of Officers (Royal Australian Army Medical Corps (Medical)) (3rd Military District) in the honorary rank of Captain, 12th March, 1953.

NX700351 Captain H. C. Anderson is transferred to the Reserve of Officers (Royal Australian Army Medical Corps (Medical)) (2nd Military District), 3rd April, 1953.

#### Citizen Military Forces.

*Eastern Command: Second Military District.*

*Royal Australian Army Medical Corps (Medical).*—2/66219 Major D. R. Reid is transferred to the Reserve of Officers (Royal Australian Army Medical Corps (Medical)) (2nd Military District), 8th January, 1953.

*Southern Command: Third Military District.*

*Royal Australian Army Medical Corps (Medical).*—To be Majors: 3/82441 Captain (Temporary Major) D. C. Cowling, 16th April, 1953, and 3/101815 Captain G. W. Cooper, 28th April, 1953.

The provisional ranks of the following officers are confirmed: Lieutenant-Colonels 3/50084 H. McLorinan and 3/50087 H. J. B. Stephens. 3/101821 Captain I. A. L. Ferguson is appointed from the Reserve of Officers, 23rd April, 1953. To be Captain (provisionally), 8th May, 1953: 3/146014 Graeme James Pollock.

*Central Command: Fourth Military District.*

*Royal Australian Army Medical Corps (Medical).*—4/35254 Major R. A. Isenstein is appointed from the Reserve of Officers, 27th March, 1953. To be Temporary Major, 30th April, 1953: 4/31905 Captain G. W. E. Aitken.

*Western Command: Fifth Military District.*

*Royal Australian Army Medical Corps (Medical).*—The provisional rank of 5/26429 Captain (Temporary Major) K. W. H. Harris is confirmed.

#### Reserve Citizen Military Forces.

*Royal Australian Army Medical Corps.*

*3rd Military District.*—To be Honorary Captains: Bernard Thomas Rimington, 28th March, 1953, William Noel Gordge, 29th March, 1953, Ian Gordon Nicol, 1st April, 1953, and John Kendall Francis, Ian Norman Nunn, Lloyd Kenneth Morgan, William Archibald Syme and Kenneth Hay McLean, 8th May, 1953.

*5th Military District.*—To be Honorary Captain, 1st May, 1953: John Andrew Rogers.

# Congresses.

## ITALIAN SOCIETY OF OBSTETRICS AND GYNECOLOGY.

THE forty-third National Congress of the Italian Society of Obstetrics and Gynecology will be held in Rome between September 21 and 24, 1953. Speakers will include Professor Luigi Cattaneo, on modern trends in gynæcological surgery, and Professor Mario Masazza, on allergic phenomena in obstetrics and gynæcology. Translation of speakers' contributions will be made into Italian, German, English and French. Attendance at the congress is free to all members of Italian and foreign societies of obstetrics and gynæcology. Further information may be obtained from Professor Piero Cattaneo, Secretary-General, Clinica Obstetrica e Ginecologica dell' Università di Roma, Casella Postale Nomentano 7171, Rome.

# The Royal Australasian College of Physicians.

## ADMISSIONS TO MEMBERSHIP.

THE following candidates who were successful at an examination for membership held in April-May, 1953, were admitted to membership of The Royal Australasian College of Physicians at a meeting of the Council of the College held on May 30, 1953: Dr. F. Harding Burns, Dr. H. P. B. Harvey, Dr. J. B. Hickie and Dr. J. D. McDonald, of New South Wales; Dr. P. R. Bull, Dr. B. H. Gandevia, Dr. R. A. Joske, Dr. J. A. W. Kelly and Dr. J. L. Stubbe, of Victoria; Dr. D. A. Hicks, Dr. S. C. Milazzo and Dr. W. M. Moore, of South Australia; Dr. J. S. Calder, of Western Australia; Dr. E. G. Galea, of Queensland; Dr. D. E. Anderson, of Tasmania.

## SIMS COMMONWEALTH TRAVELLING PROFESSOR, 1953.

SIR CHARLES SYMONDS, physician at the National Hospital for Nervous Diseases, Queen Square, London, who has been appointed a Sims Commonwealth Travelling Professor for 1953, will visit Australia and New Zealand in October and November, 1953. He will conduct clinical demonstrations and ward rounds and will deliver lectures in Adelaide, Sydney and Melbourne. His itinerary in Australia will be as follows: Adelaide, October 4 to 10; Sydney, October 10 to 16; Melbourne, October 16 to 29. Notice of his lectures, some of which will be open to all members of the medical profession, will be published in this journal at a later date.

# Obituary.

## JEAN SELDON STOBO.

JEAN SELDON STOBO, who died at Kingaroy, Queensland, on June 3, 1953, matriculated from Ravenswood College and graduated in arts from the University of Sydney in 1917, before starting medicine in the following year. With her sister Joyce, who died a short while ago, she held the unique record of two sisters winning the Fairfax medal in the junior public examinations. During her university course she held the positions of secretary and vice-president of the Women's Union and was elected president, but owing to ill health had to resign. She studied medicine at the Royal Prince Alfred Hospital. The Senior Year Book of the University of Sydney Medical School in 1922 describes her as "one of the nicest girls in the year".

After graduation she came to Brisbane and held resident appointments at the Brisbane General Hospital, the Hospital for Sick Children, the Lady Bowen Hospital and the Lady Lamington Hospital, and followed these terms of residency by a long spell of *locum tenens* work in many parts of Queensland.

In 1930 she went overseas for twelve months for post-graduate study in London and Vienna. Returning to Queensland, she settled in Kingaroy in the South Burnett district and commenced what was to be her life's work. For the next twenty years she carried on a busy general practice in that delightful town, holding at the same time an honorary appointment at the Kingaroy District Hospital.

A close friend writes: "When the news of Dr. Jean Stobo's death was received a gloom was cast over the Kingaroy district and over the whole State of Queensland. Many will sadly feel the poorer for her passing hence. Dr. Stobo served her generation faithfully and bravely, upholding the highest ideals both as a citizen and as a member of the medical profession. She was admired for her ability and esteemed for her unfailing goodness and kindness, and for the unswerving devotion of her work for suffering humanity. She will be held in everlasting affection and regard by all who knew her well."

## DAVID JOSEPH MONK ADAMS.

DAVID JOSEPH MONK ADAMS died in his sleep on April 25, 1953, at the age of thirty-three years. The eldest son of the late William Charles Adams and of Mrs. M. H. Adams, of Turramurra, New South Wales, he was educated at Knox Grammar School and the University of Sydney. He graduated as a bachelor of science in 1942, with first class honours in physiology and the university medal, and as a bachelor of medicine and bachelor of surgery in 1945, with second class honours and the Chapman Prize for original work on hæmopoiesis. During his undergraduate days he was a member of the ice hockey team and of the Sydney University Dramatic Society. He was a resident medical officer at Sydney Hospital in 1945 and 1946. In 1947 he received the degree of master of science of the University of Sydney. Teaching appointments held in the department of physiology included those of demonstrator and lecturer in physiology to physiotherapy and science students in 1942 and 1943, teaching fellow in physiology in 1946 and 1947, and lecturer in 1952.

## DISEASES NOTIFIED IN EACH STATE AND TERRITORY OF AUSTRALIA FOR THE WEEK ENDED MAY 30, 1953.[1]

| Disease. | New South Wales. | Victoria. | Queensland. | South Australia. | Western Australia. | Tasmania. | Northern Territory. | Australian Capital Territory. | Australia. |
|---|---|---|---|---|---|---|---|---|---|
| Acute Rheumatism | 1 | 7(4) | .. | .. | 1 | .. | .. | .. | 9 |
| Amœbiasis | .. | .. | .. | .. | .. | .. | 1 | .. | 1 |
| Ancylostomiasis | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Anthrax | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Bilharziasis | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Brucellosis | .. | 2 | .. | .. | .. | .. | .. | .. | 2 |
| Cholera | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Chorea (St. Vitus) | .. | 2(2) | .. | .. | .. | .. | .. | .. | 2 |
| Dengue | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Diarrhœa (Infantile) | 4(4) | 1(1) | 8(6) | .. | .. | .. | .. | .. | 13 |
| Diphtheria | 14(6) | 3(3) | 7(2) | .. | 3(1) | .. | .. | .. | 27 |
| Dysentery (Bacillary) | .. | .. | 4(4) | .. | .. | .. | .. | .. | 4 |
| Encephalitis | .. | 1 | 4 | .. | .. | .. | .. | .. | 5 |
| Filariasis | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Homologous Serum Jaundice | .. | 1 | .. | .. | .. | .. | .. | .. | 1 |
| Hydatid | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Infective Hepatitis | .. | 10(6) | .. | .. | 6(5) | .. | 1 | .. | 17 |
| Lead Poisoning | .. | .. | 1 | .. | .. | .. | .. | .. | 1 |
| Leprosy | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Leptospirosis | .. | .. | 9 | .. | .. | .. | .. | .. | 9 |
| Malaria | .. | .. | .. | 1 | .. | 2 | .. | .. | 10 |
| Meningococcal Infection | 3(1) | 4(2) | .. | .. | .. | .. | .. | .. | .. |
| Ophthalmia | 1(1) | .. | .. | .. | 8 | .. | .. | .. | 9 |
| Ornithosis | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Paratyphoid | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Plague | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Poliomyelitis | 12(8) | 4(1) | 5 | 9(6) | 2 | 3(2) | .. | .. | 35 |
| Puerperal Fever | .. | 21(11) | .. | .. | 2 | .. | .. | .. | 23 |
| Rubella | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Salmonella Infection | .. | 56(36) | .. | 1(1) | .. | 1(1) | .. | .. | 72 |
| Scarlet Fever | 14(11) | .. | .. | .. | .. | .. | .. | .. | .. |
| Smallpox | .. | .. | 1 | .. | .. | .. | .. | .. | 1 |
| Tetanus | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Trachoma | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Trichinosis | .. | 8 | 12(8) | 10(8) | 5(2) | 6(3) | .. | .. | 78 |
| Tuberculosis | 37(20) | .. | .. | .. | .. | .. | .. | .. | .. |
| Typhoid Fever | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Typhus (Flea-, Mite- and Tick-borne) | 1 | .. | .. | .. | 2 | .. | .. | .. | 3 |
| Typhus (Louse-borne) | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Yellow Fever | .. | .. | .. | .. | .. | .. | .. | .. | .. |

[1] Figures in parentheses are those for the metropolitan area.

In 1948 Monk Adams was granted a Rockefeller Travelling Fellowship in the United States of American and Canada, and he went to work under Professor C. H. Best at the Banting and Best Institute of Medical Research in Toronto. His fellowship was extended to two years at the request of Professor Best, and in 1949 he was appointed a research associate at the University of Toronto. He also worked at Boston and Washington. Australians visiting the United States and Canada heard with pleasure of the high reputation that he had earned among those with whom he worked. He had many contributions published in medical and other scientific literature.

Monk Adams was a diabetic from childhood. This made him unfit for military service, but gave him a great interest in endocrinology. Outside medicine his principal interest was in radio. At the age of fourteen years he was the youngest licensed amateur radio operator in Australia, and he had communicated with over 25 different countries on his own-made transmitter and receiver when he won the "D.X." contest in 1936. His call sign was VK2AE, and he was made an honorary member of the A1 Operators Club of America, of whom there were very few in Australia. Of recent years he carried out work for the Radio Research Board. He is survived by his mother, three sisters (two of whom, Dr. Alice Hare, of Melbourne, and Dr. Corona Monk Adams, of Sydney, are doctors) and two brothers.

## Australian Medical Board Proceedings.

### NEW SOUTH WALES.

THE following have been registered, pursuant to the provisions of the *Medical Practitioners Act*, 1938-1950, as duly qualified medical practitioners: Barnes, Henry Clifford Brockwell, M.B., B.S., 1951 (Univ. Melbourne); McCracken, James Murray, M.B., B.S., 1941 (Univ. Melbourne), M.R.C.O.G., 1949; Terry, Judith Maud, M.B., B.S., 1950 (Univ. Melbourne); Willing, Charles Eric, M.B., B.S., 1928 (Univ. Adelaide); Stoney, John David Augustine, M.B., B.S., 1951 (Univ. Melbourne); Costin, Lilian Margaret, M.B., B.S., 1951 (Univ. Durham); Smith, George Mackay, M.B., B.S., 1950 (Univ. Queensland); Sloan, William Nicol, M.B., B.S., 1950 (Univ. Melbourne); Schmalzbach, Oscar, registered in accordance with the provisions of Section 17 (1) (*d*) (ii) of the *Medical Practitioners Act*, 1938-1950.

The following additional qualifications have been registered: Hirshman, Hans (M.B., B.S., 1946, Univ. Sydney), D.P.H., 1953 (Univ. Sydney); Sugerman, David Alexander (M.B., B.S., 1953, Univ. Sydney), B.Sc. (Med.), 1950 (Univ. Sydney); Nagy, Gabriel Stephen (M.B., B.S., 1946, Univ. Sydney, M.R.C.P. (London), 1951), M.R.A.C.P., 1952; Blaxland, Peter Dudley (M.B., B.S., 1943, Univ. Sydney), F.R.C.S., 1952.

## Medical Prizes.

### THE STAWELL PRIZE.

THE Stawell Prize, a memorial to Sir Richard Stawell, is open for competition. The amount of the prize is £30 (thirty pounds). The conditions are as follows:

1. The prize shall be awarded to the writer of the essay adjudged to be the best on a subject selected annually.

2. The subject for 1953 is "Use and Abuse of Antibiotics".

3. The dissertation should be based on personal observation and experience of the writer.

4. The competition is open to graduates of any Australian university.

5. The trustees reserve the right to withhold the award.

6. Essays must be delivered to the Medical Secretary, British Medical Association (Victorian Branch), by 4 p.m. on March 31, 1954.

7. Each essay must be typewritten or printed and must not exceed 75,000 words in length.

8. Each essay must be distinguished by a motto and must be accompanied by a sealed envelope marked by the same motto, containing the name and address of the author.

9. The trustees reserve the right to publish the prize essay.

## Medical Appointments.

Dr. James Amess Troup has been appointed psychiatrist, Mental Hygiene Branch, Department of Health, Victoria, pursuant to the provisions of the *Mental Hygiene Authority Act*, 1950, of Victoria.

## Nominations and Elections.

THE undermentioned has applied for election as a member of the New South Wales Branch of the British Medical Association:

Dormer, John Cecil, M.B., 1952 (Univ. Sydney), 12 Selbourne Street, Burwood, New South Wales.

## Diary for the Month.

JULY 7.—New South Wales Branch, B.M.A.: Council Quarterly.
JULY 10.—Queensland Branch, B.M.A.: Council Meeting.
JULY 13.—Victorian Branch, B.M.A.: Finance Subcommittee.

## Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

*New South Wales Branch* (Medical Secretary, 135 Macquarie Street, Sydney): All contract practice appointments in New South Wales.

*Victorian Branch* (Honorary Secretary, Medical Society Hall, East Melbourne): Associated Medical Services Limited; all Institutes or Medical Dispensaries; Australian Prudential Association, Proprietary, Limited; Federal Mutual Medical Benefit Society; Mutual National Provident Club; National Provident Association; Hospital or other appointments outside Victoria.

*Queensland Branch* (Honorary Secretary, B.M.A. House, 225 Wickham Terrace, Brisbane, B17): Brisbane Associated Friendly Societies' Medical Institute; Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

*South Australian Branch* (Honorary Secretary, 178 North Terrace, Adelaide): All Contract Practice appointments in South Australia.

*Western Australian Branch* (Honorary Secretary, 205 Saint George's Terrace, Perth): Norseman Hospital; all Contract Practice appointments in Western Australia. All government appointments with the exception of those of the Department of Public Health.

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